# Formal Linking in Internally-Headed Relatives[*]

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*Abstract*: This paper aims to clarify and resolve issues surrounding the so-called formal linking problem in interpreting the Internally Headed Relative Clause construction in Korean and Japanese, a problem that has been identified in recent E-type pronominal treatments of the construction (e.g., Hoshi 1995, Shimoyama 1999). In the literature, this problem refers to the difficulty of capturing the delimited semantic variability of the E-type pronoun present in the embedding clause of the construction. I show that the E-type pronoun at issue is subject to a different licensing condition from a typical E-type pronoun and therefore presents a different linking problem. More specifically, it requires that the embedded clause describe a state of its antecedent and its descriptive content be supplied by a salient property represented in the logical form of the embedded clause. I propose an event-based semantic analysis that derives the effects of this novel generalization by establishing a binding relation between the event structure of the embedded clause and the denotation of the E-type pronoun.

*Key words:* Internally Headed Relatives, E-type pronoun, formal linking problem

## 1. INTRODUCTION

The present paper is concerned with the so-called formal linking problem in interpreting the Internally Headed Relative Clause (IHRC) construction in Korean and Japanese, a problem that has been identified in recent E-type pronominal treatments of the construction (e.g., Hoshi 1995, Shimoyama 1999, Shimoyama 2001, chapter 3).

The IHRC constructions in Japanese and Korean (henceforth IHRC constructions) have a different form and meaning from the more familiar Externally-Headed Relative Clause (EHRC) constructions, although they are also marked by a relative marker, *–un* in Korean and the zero morpheme $\varnothing$ in Japanese. This can be seen by comparing (1-2) and (3-4). In terms of form, while an EHRC contains a gap *e* which is co-indexed with the head noun that occurs externally to the relative clause, an IHRC is gap-less because its head noun occurs internally to it, as highlighted below. Furthermore, an IHRC is followed by the grammatical element *kes* in Korean and *no* in Japanese, which will prove

to play an important role in the interpretation.[1] In terms of meaning, whereas the content of an EHRC restricts the content of the head noun, an IHRC is interpreted as restricting the content of the embedding clause (Kuroda 1975-1977, reprinted in Kuroda 1992) or being asymmetrically coordinated with it, as the English translations suggest.[2]

(1)     The EHRC construction in Korean
        Antony-nun     [[$e_i$      tomangka-n]-**un**     **totwuk$_i$**]-ul  capassta.
        A.-top         [[\_\_\_      run.away-imprf]-**rel**  **thief**]-acc     caught
        'Antony caught a/the thief who was running away.'

(2)     The IHRC construction in Korean:
        Antony-nun [[**totwuk**-i    tomangka-n]-**un**     **kes**]-ul        capassta.
        A.-top          [[**thief**-nom  run.away-imprf]-**rel**  **kes**]-acc       caught
        'Antony caught a/the thief <u>when</u> he (= the thief) was running away.'
        'A/the thief who was running away <u>and</u> Antony caught him (= the thief).'

(3)     The EHRC construction in Japanese:
        Antony-wa      [[$e_i$      nige-teiru]-∅          **doroboo$_i$**]-o tukamaeta.
        A.-top         [[\_\_\_      run.away-imprf]-**rel**  **thief**]-acc     caught
        'Antony caught a/the thief who was running away.'

(4)     The IHRC construction in Japanese:
        Antony-wa [[**doroboo**-ga      nige-teiru]-∅         **no**]-o          tukamaeta.
        A.-top       [[**thief**-nom      run.away-imprf]-**rel**  **no**]-acc        caught
        'Antony caught a/the thief <u>when</u> he (= the thief) was running away.'
        'A/the thief who was running away <u>and</u> Antony caught him (= the thief).'

        The overt syntactic position of the head noun of an IHRC raises the question of how it gets accessed by the predicate of the embedding clause, because there is a  clear intuition that its meaning serves as (part of) the meaning of an argument of the embedding predicate. For instance, in (2) and (4), what Antony caught was the thief who was running away but there is no overt link between the head noun of the embedded IHRC, namely, *totwuk* or *doroboo*, and a part of the embedding clause.
        In the literature, it is widely held that the meaning of an internal head noun becomes accessible to the embedding clause via an E-type pronoun whose presence is indicated by the grammatical element that immediately follows the IHRC, namely, *kes* in Korean and

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[1] The precise status of *kes* and *no* has been rather controversial in the literature: some authors have treated them as nominalizers (e.g., N. Kim 1984; Kuroda 1976-77, Jo 2003), and others as complimentizers (e.g., Jhang 1994; Hoshi 1995) or pronouns (e.g., B. Yang 1993, Chung and Kim 2003). For present purposes, their exact morpho-syntactic status is not so crucial, although, for concreteness' sake, I will adopt a pronominal analysis (see section 4.1). Hence, to keep matters simple in citing data from the existing literature, I will not gloss them throughout the paper.

[2] In this paper, the Korean data are transcribed by using Yale Romanization and the following abbreviations are used for both the Korean and Japanese data:
    acc: accusative; cl: classifier; comp: complementizer; conj: conjunction; cop: copular verb; dat: dative case; decl: declarative sentence ending; gen: genitive case; imprf: imperfective aspect; inst: instrumental case; loc: locative; nom: nominative case; pl: plural; pst: past tense; prf: perfect aspect; prfv: perfective aspect; prog: progressive aspect; rel: relative marker; top: topic.

*no* in Japanese (Hoshi 1995, Shimoyama 1999, Matsuda 2002). It is commonly assumed that an E-type pronoun spells out 'the unique/maximal individual that has a salient property provided by context' (Evans 1977, Cooper 1979, Heim 1990, see also Elbourne 2001, 2005). Hence, postulating an E-type pronoun in the structure of the IHRC construction amounts to assuming that the link between an internal head noun and the embedding clause is established indirectly by recovering a salient property such as being a thief from context, which can provide the descriptive content for the E-type pronoun present in the embedding clause. Obviously, this interpretive process is reminiscent of the way in which sentences containing typical E-type pronouns are interpreted. As illustrated in (5) and (6), an E-type pronoun is also interpreted by recovering a salient property from context that can restrict its value. This suggests that the IHRC construction might be one of those constructions that instantiate E-type anaphora (cf. Kubota and Smith to appear).

(5) Few congressmen admire Kennedy. **They** (= the congressmen who admire Kennedy) are all junior.

(6) Every farmer who owns a donkey beats **it** (= the donkey he owns).

The E-type pronoun analysis of the IHRC construction has proven to be superior to the existing analyses in several respects. For instance, it is exempt from a syntactic problem that afflicts the referential pronoun analysis. Under the referential pronoun analysis (e.g., Kitagawa 2005), the pronoun c-commands its antecedent, as the first branching node that dominates it also dominates its antecedent and they do not dominate each other, as schematized in (7). (Here, *kes* represents the pronoun and DP inside the IP represents its antecedent.) Hence, if the antecedent of a pronoun is a referring expression, then the configuration incurs a violation of the Condition C of the Binding Theory, which says that referring expressions must be free, meaning they should not be both c-commanded and co-indexed by a noun phrase in the same binding domain.

(7)
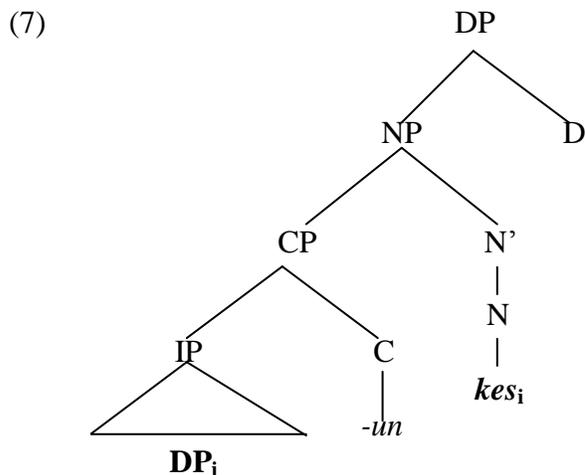


The E-type pronoun analysis does not suffer from this problem, by contrast, because it analyzes the pronoun as a discourse anaphor to which binding conditions do not apply.

Given this advantage (and several others not mentioned here in the interest of space), the E-type pronoun analysis of the IHRC construction has been considered a viable solution to the syntax-semantics mismatch problem presented by the construction (Shimoyama 2001, chapter 3, Matsuda 2002, Kitagawa 2005).[3] Yet it is often the case that the greatest strength of an analysis constitutes its greatest weakness. This applies to the E-type pronoun analysis as well. This theory predicts that the IHRC construction can be interpreted as long as some salient property can be recovered from context, restricting the value of an E-type pronoun present in the structure. It has been observed, however, that this allegedly discourse-oriented pronoun requires some sort of formal link between itself and its antecedent, reminding us of the formal link problem of typical E-type pronouns (Hoshi 1995, Shimoyama 1999).

In the current linguistic literature, the formal linking problem presented by the IHRC construction remains outstanding, just like that of typical E-type pronouns. In my view, what makes this problem so recalcitrant is the lack of clear understanding of what counts as a formal link between an E-type pronoun and its intended antecedent. Hence this problem cannot be resolved unless its key components are clearly identified.

For this reason, this paper seeks to achieve two goals: one is to state clearly the formal linking problem presented by the IHRC construction. The other is to propose a solution to it. The solution to be offered builds upon the insights of Hoshi (1995) and Shimoyama (2001, chapter 3) but it also improves upon them. Following Hoshi, I argue that interpreting an E-type pronoun involves recovering a salient property from the linguistic context provided by the embedded clause. But I also diverge from him by claiming that this salient property needs not be provided in the form of an overtly realized NP in the embedded clause. Similarly, I draw on Shimoyama's observation that, for a sentence containing an IHRC to be judged or acceptable, there has to be some sort of link between the event structure of the embedded clause and the semantics of the E-type pronoun present in the embedding clause. I elaborate on this observation, however, by showing that what is linked to the E-type pronoun's denotation is not an event but a state that temporally intersects with the eventuality described by the embedding clause.

This paper proceeds as follows: Section 2 clarifies what constitutes the formal linking problem presented by the IHRC construction by reviewing the relevant literature. It establishes that the E-type pronoun present in the construction is subject to a different licensing condition from a typical E-type pronoun and hence presents a different linking problem. Section 3 outlines a more accurate descriptive generalization on the licensing condition of the E-type pronoun occurring in the IHRC construction. More specifically, it shows that both the grammatical and lexical aspect of the embedded clause's predicate play a crucial role in licensing the E-type pronoun. Section 4 proposes a revised E-type pronoun analysis of the IHRC construction by implementing the descriptive generalization offered in section 3. Section 5 summarizes and concludes the paper.

## 2. WHAT HAS BEEN THE LINKING PROBLEM OF THE IHRC CONSTRUCTION?

In the literature, there are two diverging views on what constitutes the formal linking problem presented by the IHRC construction. One view is represented by Hoshi (1995)

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[3] Due to its numerous advantages, the E-type pronoun analysis has even been extended to the IHRC constructions in other languages as well (e.g., Hastings 2002 for its application to IHRCs in Cuzo Quechua).

and the other is represented by Shimoyama (2001). Below these two views are reviewed in detail.

*2.1. Hoshi 1995: A formal link is an overt NP antecedent.*

Hoshi (1995) observes that there are cases in which a sentence instantiating the IHRC construction cannot be interpreted even though contextual factors alone can readily provide the descriptive content for the E-type pronominal present in the embedding clause. This is illustrated by the contrast between the following Japanese sentences.[4]

(8)    Yamada-san-wa  [[otonari-no    musukosan-ga  **wakai**     **oyomesan**-o
       Y.-hon-top      [[next.door-gen  son-nom    **young**     **bride**-acc
       morratta]-∅     no]-o       tyoonai-no     huzinkai-ni
       got]-rel       no]-acc    neighborhood-gen  women's club-dat
       anyuusiyootosita.
       tried to talk into joining
       'The next door neighbor's son got a <u>young bride</u> and Ms. Yamada tried to talk **her (= the young bride)** into joining the women's club in the neighborhood.'

(9)    **\***Yamada-san-wa  [[otonari-no    musukosan-ga  **kekkonsita**]-∅  no]-o
       Y.-hon-top      [[next.door-gen  son-nom    **married**]-rel    no]-acc
       tyoonai-no       huzinkai-ni        kanyuusiyootosita.
       neighborhood-gen    women's club-dat    tried to talk into joining
       Intended: 'The next door neighbor's son <u>got married</u> and Ms. Yamada tried to talk **her (= his wife)** into joining the women's club in the neighborhood.'
                                        (Hoshi 1995:151, (70) & (71))

Under Hoshi's analysis of the IHRC construction, which builds upon Cooper's (1979) analysis of typical E-type pronouns, the E-type pronoun present in the matrix clauses of (8) and (9) stands in a contextually salient relation $T$ to the contents of the embedded clauses. Hence, the two sentences receive the following interpretations:

(10)  <u>Interpretation of (8):</u>
     $\exists y \forall z[[^\vee T (^\wedge \exists x[\text{young\_wife\_of\_ the\_ neighbor's\_son (x)} \& \text{brought\_home\_by the neighbor's son}(x)])](z) \leftrightarrow z = y] \& \text{talk\_into\_joining\_the\_women's\_club}(y)(\text{Ms. Yamada})]$

(11)  <u>Interpretation of (9):</u>
     $\exists y \forall z[[^\vee T (^\wedge \exists x[\text{got\_married\_to\_the neighbor's son (x)} \& \text{brought\_home\_by the neighbor's son}(x)])](z) \leftrightarrow z = y] \& \text{talk\_into\_joining\_the\_women's\_club}(y)(\text{Ms. Yamada})]$

On these interpretations, the embedded clauses of the two sentences can provide 'being the young wife of the neighbor's son' and 'being married to the neighbor's son' as the value of the free relational variable $T$. These relations are similar enough to make both

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[4] This also holds true of Korean. In fact, one can safely assume that the properties of Japanese IHRCs are shared by their Korean counterparts and vice versa, unless noted otherwise. Hence, the relevant properties of the IHRC construction will be illustrated with the data from one of the two languages, not both.

sentences interpreted as 'Ms. Yamada tried to talk her neighbor's son's wife into joining the women's club'. Contrary to prediction, however, only (8) is judged grammatical on the intended reading.[5]

Hoshi hypothesizes that the contrast between (8) and (9) stem from the presence vs. absence of an overt NP in the embedded clause that can serve as the antecedent of the E-type pronoun in the embedding clause. That is, (8) is good because *wakai oyomesan* 'young wife' can serve as the antecedent of the E-type pronoun, but (9) is not, because it contains no such overtly realized antecedent of the E-type pronoun. Interestingly, this contrast is paralleled by the contrast between the sentences in (12) which contain typical E-type pronouns.

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

<div align="right">(Evans 1977: 532, emphasis added)</div>

On the basis of this parallel, Hoshi concludes that the E-type pronoun present in the IHRC construction is subject to the same kind of licensing condition as a typical E-type pronoun, that is, it requires the presence of an overtly realized NP antecedent in the preceding discourse. Since an E-type pronoun is presumably a discourse anaphor and hence exempt from structural constraints, its need for an overt NP antecedent in the embedded clause constitutes a problem.

Under scrutiny, however, it turns out that Hoshi's characterization of the phenomenon is not entirely accurate: the E-type pronoun present in the IHRC construction differs from a typical E-type pronoun in that it cannot be licensed unless its antecedent occurs in the immediately preceding clause, as the contrast between (13) and (14) shows (Shimoyama 1999).

(13)   Typical E-type pronoun anaphora in Korean:[6]
       Taypwupwun-uy kwunhoyuywon-tul-i     Hilrari-lul    conkyengha-n-ta.
       most-gen         congressman-pl-nom     H.-acc        admire-imprf-decl
       'Most congressmen admire Hilary (Rodam Clinton).'
       Nayil-un         senke-il-i-ta.
       Tomorrow-top     election-day-cop-decl
       'Tomorrow is the election day.'
       Na-nun **ku-tul**-i    **kunye**-lul    wihay    thwuphyo-ha-ess-umyen
       I-top   **he-pl-**nom   **she**-acc      for      vote-do-pst-cond
       cohkeyss-ta.
       feel.happy-decl
       'I will be happy if <u>they</u> (= the congressmen who admire Hilary) vote for <u>her</u> (= Hilary).'

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[5] Sentence (9) is judged acceptable if the E-type pronoun is construed as referring to Ms. Yamada's neighbor's son, even though this reading is pragmatically anomalous, since few men would join a women's club.

[6] The properties of typical E-type pronouns in Korean are also displayed by typical E-type pronouns in English as well, as the English translations of the relevant Korean examples suggests. Hence, illustration of the English facts will be omitted here and throughout.

(14)     The IHRC construction in Korean
        Yeonghee-ka      **chayk**-ul      sey-kwen      sa ossta.
        Y.-nom           **book**-acc      three-cl      buy.came.
        Chelswu-nun      [Yeonghee-ga     ttohan     **shinmwun**-to
        C.-top           Y.-nom           also       **newspaper**-also
        sa o]-un         kes]-ul          chaykcang-ey     neh-ess-ta.
        bought.came]-rel kes]- acc        book.shelf-loc   place-pst-decl
        'Yeonghee bought and brought home three books. She also bought and brought
        home newspapers and Taro put them (= the newspapers) on the bookshelf.'
                    (Adapted from Shimoyama: 1999, example (45), emphases added)

In (13), the E-type pronouns in the third sentence, i.e., *ku-tul* 'them' and *kunye* 'she' can
refer to individuals that were introduced in the first sentence, namely, the congressmen
who admire Hilary and Hilary, respectively. But the E-type pronoun that occurs in the
second sentence of (14) can refer only to an individual that was introduced in the
immediately preceding clause, namely, the embedded clause. This is evidenced by the
fact that the pronoun cannot refer to the three books that Yeonghee bought and brought
home, nor can it refer to the plural entity that consists of the three books and the
newspapers, despite the fact that it is also highly plausible that Chelswu shelved the
books, along with the newspapers that Yeonghee bought and brought home. Under the
standard E-type pronoun analysis (e.g., Cooper 1979), this fixed interpretation of the E-
type pronoun in (14) is unexpected because uttering the first sentence should make the
three books prominent enough to be referable by a pronoun.
      The E-type pronoun that occurs in the IHRC construction also differs from a typical
E-type pronoun in that not every overtly realized NP that occurs inside the embedded
clause can license it, as observed by Shimoyama (2001, chapter 3). To see this, compare
(15) and (16). These examples show that while a typical E-type pronoun can refer to
either the object of a sentential predicate or a nominal that is embedded inside the object,
the E-type pronoun in the IHRC construction can only be construed as referring to the
object nominal.

(15)     Typical E-type pronoun anaphora in Korean:
    a. Enu      namca$_i$-na     [$_{DP1}$ **caki**     **anay$_i$**]-**lul**      sonnim-kkey
       Every    man-indet      [      **self**     wife]-**acc**           guest-to
       sokayhayss-ko          sonnim-i      **kunye$_i$-lul**     cwuksi      chingchanhayssta.
       introduced-comp        guest-nom     **she-acc**          immediately praised
       'Every man introduced his wife to the guest and immediately after that the
       guest praised her.'
    b. Enu      namca$_i$-na     [$_{DP2}$[$_{DP1}$ **caki**     **anay$_i$**]-**uy**     kimpap]-ul sonnim-kkey
       Every    man-indet      [    [    **self**     wife]-**gen**     sushi]-acc   guest-to
       taycephass-ko          sonnim-i      **kunye$_i$-lul**     cwuksi           chingchanhayssta.
       served-comp            guest-nom     **she-acc**          immediately      praised
       'Every man served his wife$_i$'s sushi to the guest and, immediately after that, the
       guest praised her$_i$.'

(16)     The IHRC construction in Korean:
   a.  [Enu       namca-na      [DP1 **caki     anay**]-**lul**            sonnim-kkey
       [Every   man-indet      [    **self     wife**]-**acc**            guest-dat.hon
       sokayha-∅]-un          kes]-ul  sonnim-i    cwuksi        chingchanhayssta.
       introduce-prf]-rel      kes]-acc guest-nom   immediately praised
       'Every man introduced <u>his wife</u> to the guest and the guest praised <u>her</u>
       immediately after that'.
   b. *[Enu       namca-na      [DP2 [DP1 **caki     anay**]-**uy**         kimpap]-ul
       [Every   man-indet      [    [    **self     wife**]-**gen**        sushi]-acc
       sonnim-kkey            taycepha-∅]-un kes]-ul       sonnim-i      cwuksi
       guest-dat.hon          serve-prf]-rel    kes]-acc     guest-nom    immediately
       chingchanhayssta.
       praised
       Intended: 'Every man served <u>his wife's</u> sushi to the guest and the guest praised
       <u>her</u> immediately after that'.
                       (adapted from Shimoyama's (2001) Japanese examples (p. 121))

Yet another important difference between the E-type pronoun present in the IHRC construction and a typical E-type pronoun is that the former can be licensed even if its antecedent is not realized as a nominal in the embedded clause. This is illustrated by the contrast between (17) and (18). What is surprising about (18) is that it is judged more or less acceptable, despite the fact that the embedded clause does not contain an overt NP antecedent of the E-type pronoun, namely, a nominal that means something like 'the dirt that got onto John's pants'.[7]

(17)     Typical E-type anaphora in Korean:
         Paci-ka       teleweci-ess-ta.   #John-un  **kukes**-ul     takkanayssta.
         Pants-nom   get.dirty-pst-decl.  J.-top     **it**-acc         wiped.out
         'The pants got dirty.'                Intended: 'John wiped **it (= the dirt)** off.

(18)     The IHRC construction in Korean:
          ?John-un    [[paci-ka         teleweci-∅]-un  kes]-ul takkanayssta.
          J.-top      [[pants-nom      get.dirty-prf]-rel  kes]-acc wiped.out
          Lit.: 'The pants got dirty and John wiped <u>the dirt</u> off the pants.'
                              (adapted from Chung and Kim 2003: (40))

Taken together, these facts clearly show that there are non-trivial differences between a typical E-type pronoun and the E-type pronoun that occurs in the IHRC construction. In brief, unlike the former, the latter requires its antecedent to be present in the immediately preceding embedded clause, overtly realized in some form, though not necessarily as a nominal. We can, therefore, conclude that Hoshi's characterization of the linking problem presented by the IHRC construction merits revision.

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[7] It is worth noting that, in these sentences, the lexical semantics of the predicate of the preceding clause has something to do with getting dirty. Although this does not satisfy the widely-held licensing condition on typical E-type pronouns, it proves to be an important factor in licensing the E-type pronoun in the IHRC construction, as will be shown in section 3.2.

*2.2. Shimoyama 2001: A formal link is a direct thematic role assignment by the embedded predicate.*

Shimoyama (2001) briefly discusses the difference between a typical E-type pronoun and the E-type pronoun that occurs in the IHRC construction. She considers paradigms such as (15) and (16) and conjectures that, for the E-type pronoun in the IHRC construction to be licensed, its referent must bear a thematic role that is directly assigned by the predicate of the embedded clause (p. 143). The basis for this conjecture comes from the fact that, in the ungrammatical sentence (16b), the intended referent of the E-type pronoun does not receive its thematic role from the predicate of the embedded sentence; rather, its role comes from the nominal *kimpap* 'maki roll or sushi'.

Shimoyama's hypothesis predicts that the E-type pronoun can be licensed as long as its antecedent receives a thematic role from the embedded predicate. This prediction seems to be borne out: sentence (19) shows, for instance, that, depending on the discourse context, the E-type pronoun can be interpreted as referring to an Agent, a Theme, or a Goal.[8] Interpreting the pronoun as referring to the actress, which bears the Goal role, might seem rather difficult at first glance, but this reading becomes readily available in the following context: John has a big crush on some actress that his friend Mary knows rather well. Today he happened to see Mary introducing her friend Sue to this actress in front of a big theater. He surely did not want to miss out on this great opportunity. So he approached them and hugged the actress as if it were an accident.

(19)     Construal with an Agent, Theme, or Goal:
         John-un      [[**Mary$_i$-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$_{i/j/k}$.'

Sentences (20-23) lend further support to Shimoyama's conjecture, as they show that the E-type pronoun can refer to an individual that receives an Experiencer, a Concomitant, an Instrument, or a Location role from the predicate of the embedded clause.

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[8] Sentence (19) can receive yet another interpretation in which the E-type pronoun refers to the plural individual that consists of Mary, Sue, and the actress, as shown in (i), instantiating the so-called split antecedent phenomenon.

(i)      John-un      [[Mary$_i$-ka    ku   alumtawun    yepaywu$_k$-ekey Sue$_j$-lul
         J.-top       [[M.-nom that beautiful   actress-dat       Sue-acc
         sokayha-ko    iss-n]-un kes]-ul      (takaka-se)    **ses      ta**
         introduce-comp cop-imprf]-rel kes]-acc (approach-and)  **three    all**
         kkyeanassta.
         hugged
         'Mary$_i$ was introducing Sue$_j$ to the beautiful actress$_k$ and John hugged all three of them$_{i+j+k}$.'

(20)    Construal with an Experiencer:
John-un        [[**Mary-ka**   sulph-e          ha-ko    iss-n]-un          kes]-ul
Mary-top       [[**M.-nom**    feel.sad-conj    do-ko    cop-imprf]-rel    kes]-acc
wilohayssta.
comforted
'Mary was feeling sad and John comforted her.'

(21)    Construal with a Concomitant:
Context: Mary isn't ticklish at all, so it is no fun to try and tickle her. On the
other hand, Bill is a lot of fun to tickle. He is so ticklish that once he starts
giggling from a tickle, it can last for several minutes.
John-un        [[Mary-ka      wuntongcan-eyse    **Bill$_i$-kwa**    nol-ko
J.-top         [[M.-nom       play.ground-loc     **B.-with**        play-comp
iss-n]-un            kes]-ul       kancilephie-se    **ku$_i$**-lul   o-pwun-tongan
cop-imprf]-rel      kes]-acc      tickle-conj       **he**-acc       five-minute-period
wuskeyhayessta.
made.laugh
'Mary was playing with Bill in the playground and John (came along) and
tickled him (= Bill) and made him (= Bill) laugh for five minutes.'

(22)    Construal with an Instrument:
Context: John saw his little sister Jane working on a sculpture by using a really
sharp knife. He thought it was too dangerous for her to use the knife. So he took
it away from her and threw it away.
John-un [[Jane-i        nalkhalowu-n    **khal-lo**      cokak-ul mantul-ko
J.-top  [[J.-nom        sharp-rel        **knife-with**  sculpture-acc make-comp
iss-n]-un            kes]-ul       ppayassassta.
cop-imprf]-rel      kes]-acc      took.away
'Jane was making the sculpture with a sharp knife and John took it away from
her.'

(23)    Construal with a Location:
Theylepem-tul-i [**etten    kenmwul-eyse**   cwungyohan hoyuy-ka
Terrorist-pl-nom [**some    building-loc**    important    meeting-nom
yelli-ko            iss-n]-un          kes]-ul         supkyekhayssta.
take.place-comp cop-imprf]-rel      kes]-acc        invaded
'An important meeting was taking place in a building and the terrorists invaded
it (= the building).'

Adopting Shimoyama's conjecture can also give us a handle on sentence (18) as well,
in which the E-type pronoun is licensed despite the lack of an overtly realized nominal
antecedent in the embedded clause, running afoul of the generalization offered by Hoshi
(1995). A closer look at this sentence reveals that its embedded clause describes a
complex eventuality which comprises an event of something dirty getting onto John's
pants and a subsequent state of the pants' being dirty with the dirty stuff. Native speakers
of Korean intuit that this dirty stuff bears some role in the eventuality described by the
embedded clause. In most cases, it will be interpreted as bearing an Instrument role, as it

is responsible for making John's clothes dirty. (In this case, John's pants will bear the Theme role.) But it can also be assigned an Incremental Theme role if one (mis)interprets the embedded clause as describing an event in which some dirty stuff got created and accumulated on John's pants.[9] (On this reading, John's pants will bear the role of Location.) In the light of Shimoyama's analysis, the fact that these interpretations are available makes the sentence judged grammatical on the intended reading, despite the lack of an overt NP antecedent of the E-type pronoun.

This welcome result, in conjunction with the data in (19-23), suggests that Shimoyama's conjecture is a promising line to pursue in resolving the formal linking problem of the IHRC construction. But it is also confronted by an empirical challenge. To see this, reconsider the contrast between (8) and (9). Under Shimoyama's analysis, the grammaticality of (8) is expected, because the antecedent of the E-type pronoun receives a thematic role from the predicate of the embedded clause, namely, Theme, but the ungrammaticality of (9) comes as a surprise because, here also, the intended antecedent of the E-type pronoun receives a thematic role from the embedded predicate, namely, Concomitant: the predicate *kekkonsi* literally means 'to marry with X' in Japanese and thus it assigns Agent and Concomitant roles, as exemplified by (24).[10]

(24)    Ken-i       Mari-**to**      kekkonsi-ta.
        K.-Nom      M.-**with**      marry-pst.decl.
        'Ken married Mari.' (Lit.: 'Ken married <u>with</u> Mari.)

Since it is possible for the antecedent of the E-type pronoun to bear a concomitant role, as we have seen (21), Shimoyama's conjecture will predict (9) to come out acceptable, contrary to fact. We are therefore led to conclude that this conjecture also merits amendment, despite the genuine insight it offers on the formal linking problem of the IHRC construction.

## 3. WHAT IS THE LICENSING CONDITION OF THE E-TYPE PRONOUN IN THE IHRC CONSTRUCTION?

The foregoing discussion shows that neither an overtly realized NP antecedent in the embedded clause nor a direct thematic role assignment by the predicate of the embedded clause sufficiently licenses the E-type pronoun in the IHRC construction, although they might both constitute necessary conditions. What is then the sufficient condition? In this section, I answer this question by examining the problematic cases for the existing analyses and identifying the missing ingredients in them.

*3.1. Missing ingredient 1: A need for a closer look at the event structure of the embedded clause*

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[9] Y. Kim (2002) would call this role *Resultant Theme*, which he defines as referring to an entity that gets created as the result of the culmination of the event described by the sentence (p. 556-7).

[10] This is also true of Korean, as shown in (i).

(i)     John-i      Mary-**wa**      kelhonhay-ess-ta.
        J.-Nom      M.-**with**          marry-pst-decl.
        'John married Mary.' (Lit.: 'John married <u>with</u> Mary.)

I would like to begin this section by reexamining the contrast between (8) and (9), which challenges Shimoyama's conjecture. One might suspect that the contrast between the two sentences stems from the presence vs. absence of an overt NP antecedent of the E-type pronoun in the embedded clause, as it appears to be the only difference between them. This possibility is ruled out, however, because even if we insert the intended antecedent of the E-type pronoun in the embedded clause of (9), as in (25), the sentence is still judged to be ungrammatical on the intended reading.[11]

(25)    **\*Yamada-san-wa** [[otonari-no    musukosan-ga    **kawaii  onna-**to
        Y.-hon-top      [[next.door-gen  son-nom       **pretty  woman-**with
        kekkon-si-ta]-∅       no]-o        tyoonai-no          huzinkai-ni
        marriage-do-prf]-rel  no]-acc    neighborhood-gen   women's club-dat
        kanyuusiyootosita.
        tried to talk into joining
        Intended: 'The next door neighbor's son had gotten married to a <u>pretty woman</u> and Ms. Yamada tried to talk <u>her (= the pretty woman)</u> into joining the women's club in the neighborhood.'
        (Lit.: 'The next door neighbor's son <u>had gotten married with</u> a <u>pretty woman</u> and Ms. Yamada tried to talk <u>her (= the pretty woman)</u> into joining the women's club in the neighborhood.')

Given the ungrammaticality of (25), it is clear that even the combination of Shimoyama's conjecture with that of Hoshi's will not make a sufficient licensing condition on the E-type pronoun present in the IHRC construction. That is, there are still some ingredients missing.

What are these missing ingredients? I propose that some of the missing ingredients can be stated in the form of the following conditions: in order for the E-type pronoun present in the IHRC construction to be licensed, (i) the embedded clause must describe a state that temporally intersects with the eventuality described by the embedding clause and (ii) the intended antecedent of the E-type pronoun must bear a thematic role in that state. Imposing these conditions on the IHRC construction amounts to adding two components to Shimoyama's conjecture: (i) a more fine-grained analysis of the event structure of the embedded clause and (ii) a more precise identification of the status of the antecedent of the E-type pronoun in the event structure. Adding the second component will prove to be especially important, because it has the effect of restricting possible values for the E-type pronoun.

The proposed generalization is motivated in part by the contrast between (25) and (26). The two sentences are string-identical except for the Aspect of the embedded clause: one is perfect and the other is progressive. Yet this minimal difference yields a rather sharp contrast in grammaticality. Unlike (25), we can come up with a context that can make (26) grammatical. The following context is an illustrative case: Ms. Yamada is in charge of the women's club of her town. Recently, the club is having an enrollment problem. This problem is bothering Ms. Yamada tremendously, so, out of a desperate need to increase the enrollment of the club, she approaches the bride of her neighbor's

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[11] Again, this sentence can be judged acceptable if the E-type pronoun is construed as referring to Ms. Yamada's neighbor's son, even though this reading is pragmatically anomalous.

son while they are still having a wedding ceremony, and tries to persuade bride to join the women's club.

(26)    Yamada-san-wa  [[otonari-no     musukosan-ga    kawaii   onna-to
        Y.-hon-top        [[next.door-gen  son-nom          pretty   woman-with
        **kekkon-suru**]-∅       no]-o       tyoonai-no         huzinkai-ni
        **marriage-do.prog**]-rel  no]-acc    neighborhood-gen   women's club-dat
        kanyuusiyootosita.
        tried to talk into joining
        'The next door neighbor's son <u>was having a wedding ceremony with</u> a pretty woman and Ms. Yamada tried to talk **her (= the pretty woman)** into joining the women's club in the neighborhood.'

Why does the grammaticality or acceptability of a sentence vary depending on whether its embedded clause has progressive aspect or perfect aspect? I claim that this is because a sentence with progressive aspect and a sentence with perfect aspect have different event structures. To show this, I adopt Parsons' (1990) treatment of Aspect and make minimal changes to it (more on this section 4.2.2). According to Parsons, a progressive sentence describes an *in-progress state*, a state which describes the developmental stages of the event participants and which holds as long as the event is in development (p. 234). For instance, the English sentence *John is throwing a ball* describes the in-progress state of John and a ball, and this state holds as long as the event is in progress. On the other hand, a perfect sentence describes a *resultant state*, which is defined as a state that comes about when an event culminates. This state holds forever after the culmination of the event (pp. 234-236). Although Parsons does not explicitly state of whom a resultant state holds, there is reason to believe that it holds true of the agent argument. (Empirical justification for this idea will be given below.) Under this assumption, we can say that the English sentence *Mary has run* describes the resultant state of Mary after the culmination of the running event and this state holds permanently from that point on.

This treatment of the progressive and the perfect enables us to account for the contrast between (25) and (26). In (25), the embedded clause describes a resultant state that temporally overlaps with the eventuality described by the embedding clause, but this state holds true of the agentive subject, namely, Ms. Yamada's neighbor's son, rather than his wife. Therefore, the sentence is judged unacceptable on the reading where the E-type pronoun refers to the son's wife. By contrast, (26) is judged accepted because, here, the embedded clause describes an in-progress state which holds true not only of the son but also of his wife.

We can also account for the grammaticality of (8) by taking a closer look at the event structure of the embedded clause. Here, the embedded clause is a perfect sentence with a telic predicate. According to Parsons (1990), when perfect aspect occurs on a telic predicate, it describes a *target state*, in addition to a resultant state. A target state comes about when the event described by the sentence culminates, and it describes the temporary state of the (incremental) theme argument of the predicate. For instance, the English sentence *John has thrown a ball onto the roof* describes the state of a ball being on the roof after the event of John's throwing it culminates. This state is considered

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temporary because it ceases to hold when the ball is removed from the roof (pp. 234-5). When we apply this line of analysis to (8), it becomes clear that the embedded clause of the sentence describes a target state, i.e., the temporary state of the young bride after the culmination of the event in which she was brought to her new home.[12] This state temporarily intersects with the eventuality described by the embedding clause. Hence the entire sentence can be interpreted as 'the neighbor's son brought a young bride home and Ms. Yamada talked the young bride into joining the women's club'.

The proposed generalization on the licensing condition of the E-type pronoun in the IHRC construction seems to encompass all cases in which the sentence is judged grammatical. For instance, in (19-23), which validate Shimoyama's conjecture, the embedded clause has progressive aspect and hence describes an in-progress state which temporally intersects with the eventuality depicted in the embedding clause and this state describes the state of the intended antecedent of the E-type pronoun, regardless of whether it bears an Agent, Theme, Goal, Concomitant, Instrument, or Location role in the relevant eventuality. Turning now to sentence (18), in view of the proposed licensing condition of the E-type pronoun, it is expected to be interpretable despite the lack of an overt antecedent of the E-type pronoun in the embedded clause. The embedded clause has perfect aspect with a telic predicate. So, when we apply Parsons' treatment of perfect aspect to this sentence, we can see that its embedded clause in fact describes two target states. One describes the state of John's pants after it has gotten dirty; the other describes the state of the dirty stuff, i.e., it being accumulated onto John's pants as the result of John's pants having gotten dirty. (On this reading, the embedded predicate is analyzed as a verb of creation and, consequently, the dirt is interpreted as bearing the role of Incremental Theme, as mentioned above). These interpretations are formally represented in (27) and (28). Here, *e* ranges over events and *s* over states, and *Cul* is shorthand for 'culminates'.[13]

(27)     Logical form containing the target state of John's pants:
         $\exists e \exists x \exists y$[Make.dirty(e) & Theme(x)(e) & **john's_pants(x)** & Instrument(y)(e) & Dirty(y) & Cul(e) & $\exists$**s**[Dirty(s) & BECOME(e, s) & **Theme(x)(s)** & Hold(s)]]

(28)     Logical form containing the target state of the dirt:
         $\exists e \exists x \exists y$[Create(e) & Theme(x)(e) & **Dirty(x)** & Location(y)(e) & john's_pants(y) & Cul(e) & $\exists$**s**[On_john's pants(s) & BECOME(e, s) & **Theme(x)(s)** & Hold(s)]]

The two target states represented in (27) and (28) hold during the time interval within which the eventuality described by the matrix clause holds. Hence, the E-type pronoun present in the matrix clause can be interpreted as referring either to John's pants or to the dirty stuff that got accumulated on them. But the lexical semantics of the matrix predicate is such that it leads us to interpret the E-type pronoun as referring to the dirty stuff.

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[12] The embedded clause of (25) does not describe a target state, even though it also has perfect aspect; it only describes the resultant state of the agent argument, because its predicate *kekkon-si* 'marry (with)' is an activity verb, which is atelic.
[13] In section 4.3, a slightly different semantic analysis will be given of this sentence within the compositional system to be developed in section 4.2.

*3.2. Missing ingredient 2: the presence of a salient property in the logical structure of the embedded clause*

Let us now turn to amending Hoshi's conjecture on the licensing condition of the E-type pronoun present in the IHRC construction. Given the findings of the preceding sections, one might conclude that this idea is entirely fallacious. But this would be too quick a conclusion, for there are cases in which the E-type pronoun does seem to require an overt NP antecedent in the embedding clause. To illustrate, consider (29).

(29)　　Yamada-san-wa　[[otonari-no　　musukosan-ga　**\*(kawaii　onna-to)**
　　　　Y.-hon-top　　　[[next.door-gen　son-nom　　　　**pretty　woman-with**
　　　　**kekkon.suru**]-∅　　　no]-o　　　tyoonai-no　　　　huzinkai-ni
　　　　**marriage.do.prog**]-rel　　no]-acc neighborhood-gen　　women's club-dat
　　　　kanyuusiyootosita.
　　　　tried to talk into joining
　　　　Intended: 'The next door neighbor's son was <u>getting married to a pretty woman</u>
　　　　(by having a wedding ceremony right then) and Ms. Yamada tried to talk **her (=**
　　　　**the pretty woman)** into joining the women's club in the neighborhood.'

This sentence can be judged grammatical only when the nominal *kawai onna-to* 'pretty woman-with' is present in the embedded clause, despite the fact that the embedded clause describes an in-progress state that temporally intersects with the eventuality depicted in the embedding clause and this state holds true of the intended antecedent of the E-type pronoun. The obligatory presence of this nominal seems rather baffling, especially in view of the fact that (18) is judged acceptable even though the embedded clause does not contain an overt NP antecedent of the E-type pronoun.

Given this state of affairs, the begging question is: when is an overt NP antecedent of the E-type pronoun required and when is it not? I submit that an overt NP antecedent is required when, without it, the logical structure of a sentence instantiating the IHRC construction will contain no salient property of individuals that can restrict the value of the E-type pronoun and consequently identifying the referent of the pronoun becomes exceedingly difficult. In other words, the obligatory presence of an overt NP antecedent in the embedded clause is regulated by the need for an identificational device with which to pinpoint the E-type pronoun's antecedent.

To take up the second part of the question, I claim that the presence of an NP antecedent is not necessary if the lexical semantics of the embedded predicate is such that it can readily provide the needed descriptive content for the E-type pronoun. To illustrate, in (18), the E-type pronoun refers to something like 'the dirty stuff that got onto John's pants'. Importantly, the embedded predicate is the passive counterpart of the causative-inchoative predicate *telep-hi* 'dirty-CAUSATIVE' and it can be (mis)analyzed as a verb of creation whose denotation has to do with creating something dirt in or on somewhere, thereby making that location dirty. Under this interpretation, the logical structure of the sentence will contain an implicit instrument that has the property of being dirty and this property can serve as the descriptive content of the E-type pronoun in the embedding clause. Therefore, the sentence can be judged acceptable on the intended reading, despite the lack of an overt NP antecedent of the E-type pronoun in the embedded clause.

We can apply a similar line of reasoning to cases in which the embedded clause contains an NP whose meaning is related to the intended antecedent of the E-type pronoun but is not exactly identical to it. Such cases are exemplified by (30) and (31).

(30)  John-un      [[Mary-ka    **hongsi**-lul                     mal-li-∅]-un
      J.-top       [[M.-nom     **ripe.fresh.persimmon**-acc       dried-cau-prf]-rel
      kes]-ul      mekessta.
      kes]-acc     ate
      'Mary dried <u>a ripe persimmon</u> and John ate <u>it (= the dried persimmon)</u>.'

(31)  John-un      [[Mary-ka    **nal**      **sayngsen**-ul    ik-hi-∅]-un
      J.-top       [[M.-nom     **raw**      **fish**-acc       cooked-cau-prf]-rel
      kes]-ul      mekessta.
      kes]-acc     ate
      'Mary cooked <u>raw fish</u> and John ate <u>it (= the cooked fish)</u>.'

In the above sentences, what is interpreted as the antecedents of the E-type pronouns are the dried persimmon and the cooked fish, but the embedded clauses do not contain NPs with such denotations. When we consider the logical structures of these sentences, however, we can see that the lexical semantics of the embedded predicates generate the needed properties, just like what we just saw in (18). In both sentences, the needed properties, namely, 'being dried' and 'being cooked', are represented in the logical structures in the form of state descriptions, as shown in (32) and (33).[14] And this is why the sentences can be understood to mean what they are intended to mean.

(32)  <u>Logical structure of the embedded clause of (30):</u>
      $\exists$e[Cul(e) & dry(e) & Agent(Mary)(e) & $\exists$e'$\exists$x[Cul(e') & Theme(x)(e) &
      ripe_persimmon(x) & CAUSE(e, e') & $\exists$**s**[Being-dried(s) & **dry(x)** &
      Theme(x)(s) & Hold(s) & BECOME(e', s)]]]
      (In plain English: 'Mary causes the ripe persimmon to become dried')

(33)  <u>Logical structure of the embedded clause of (31):</u>
      $\exists$e[Cul(e) & cook(e) & Agent(Mary)(e) & $\exists$e'$\exists$x[Cul(e') & Theme(x)(e) &
      raw_fish (x) & CAUSE(e, e') & $\exists$**s**[Being-cooked(s) & **cooked(x)** &
      Theme(x)(s) & Hold(s) & BECOME(e', s)]]]
      (In plain English: 'Mary causes the raw fish to become cooked.')

In the light of the above data, we can conclude that, in licensing the E-type pronoun present in the IHRC construction, it is necessary, though not sufficient, that the logical structure of a sentence contains a salient property that can provide the descriptive content for the pronoun, regardless of whether this property is denoted by an overtly realized NP or the predicate of the embedded clause.

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[14] These logical structures are based on Parsons' (1990) treatment of causative-inchoatives (pp. 121-123). But see also Dowty (1979) for a similar treatment of causatives.

In this section, we have identified the missing ingredients in Hoshi's and Shimoyama's conjectures. When combined, these ingredients yield (34) as the new licensing condition on the E-type pronoun present in the IHRC construction.

(34)     <u>Licensing condition of the E-type pronoun present in the IHRC construction:</u>
         The E-type pronoun present in the embedding clause is interpretable iff.
   (i)      the embedded clause describes a state that temporally intersects with the eventuality described by the embedding clause;
   (ii)     the antecedent of the pronoun bears a thematic role in that state; and
   (iii)    the logical structure of the embedded clause contains a property that holds true of the antecedent of the pronoun unless the latter is a proper name.

This novel licensing condition suggests that the E-type pronoun present in the IHRC construction is linked to its antecedent via some thematic relation that holds between a state and an individual.


## 4. A FORMAL IMPLEMENTATION OF THE PROPOSED GENERALIZATION

The purpose of this section is to offer an event-based semantic analysis of the IHRC construction that derives the effects of the licensing condition of the E-type pronoun proposed in (34). The organization of this section is as follows: First, as a preliminary to a compositional semantic analysis, outlining the overt syntactic structure of the IHRC construction will be in order. Next, I propose the lexical entries of the key morpho-syntactic components of the construction such as the grammatical element *kes/no*, the embedded clause, and the relative clause marker *–un* or zero. The proposed semantic analysis will then be applied to various types of sentences instantiating the construction.


### *4.1. The syntactic structures of the IHRC construction*

I adopt the prevailing view that the IHRC+*kes/no* string is generated as an argument of the embedding predicate (see Hoshi 1995, Shimoyama 1999, Chung and Kim 2003, J.-R. Lee 2006, among others),[15] rather than as an adjunct thereof (e.g., Tsubomoto 1991, Murasugi 1994, Mihara 1994, D. Chung 1999). I also assume with Shimoyama (1999) that the string is a DP, rather than just an NP (Chung and Kim 2003), and its head hosts the [+definite] feature which selects for an NP headed by an N-level pronominal *kes* or *no*.[16, 17] But I diverge from Shimoyama and follow Chung and Kim (2003) in treating an IHRC as a complement of the pronominal *kes/no* rather than its adjunct.

Turning now to the internal structure of an IHRC, I assume that the relativizer, i.e., –*un* in Korean and $\varnothing$ in Japanese, hosts its own projection called Relative Clause Phrase (RelP). I further posit that the embedded clause has the structure of a small clause whose highest projection is Aspect Phrase. A basis for this small clause analysis comes from the

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[15] For a relatively thorough and reliable set of arguments for this analysis, see Chung and Kim 2003.

[16] Chung and Kim (2003) offer several arguments for the N-level pronominal status of *kes*.

[17] The morpheme *no* has usually been analyzed as belonging to category D. Under such analyses, its NP sister is phonetically unrealized (e.g., Shimoyama 1999). However, whether this morpheme belongs to the D or N category does not alter the semantic analysis to be developed here, because what matters for our purposes is that each terminal node has an appropriate lexical entry and the semantic computation proceeds as it is supposed to. For expository simplicity, I will therefore assume that *no* is of the same category as *kes*.

well-known temporal dependency between the embedded clause and the embedding clause of the IHRC construction (Kuroda 1992, chapter 3, M. Kim 2004), which refers to the fact that, unlike an EHRC, an IHRC cannot bear a temporal index independently of the embedding clause. That is, the embedded clause of the IHRC construction must be interpreted with respect to the embedding clause's time. This is illustrated by the contrast between (35) and (36). In (35), the embedded clause's time can be either the matrix clause's time or the utterance time, as the two possible readings suggest. In (36), however, the embedded clause's event time can only be the matrix clause's event time and hence only one reading is available for the sentence.

(35)　　The EHRC construction in Korean:
　　　　Cleopatra-nun　　[[Antony-ka $e_i$ **ilk-n**]-un　　　chayk$_i$]-ul　　　ilkessta.
　　　　C.-top　　　　　[[A.-nom　　___ **read-imprf**]-rel　book]-acc　　　read
　　　　'Cleopatra read the book which Antony <u>was</u> reading <u>at that time</u>.' or
　　　　'Cleopatra read the book which Antony <u>is</u> reading <u>right now</u>.'
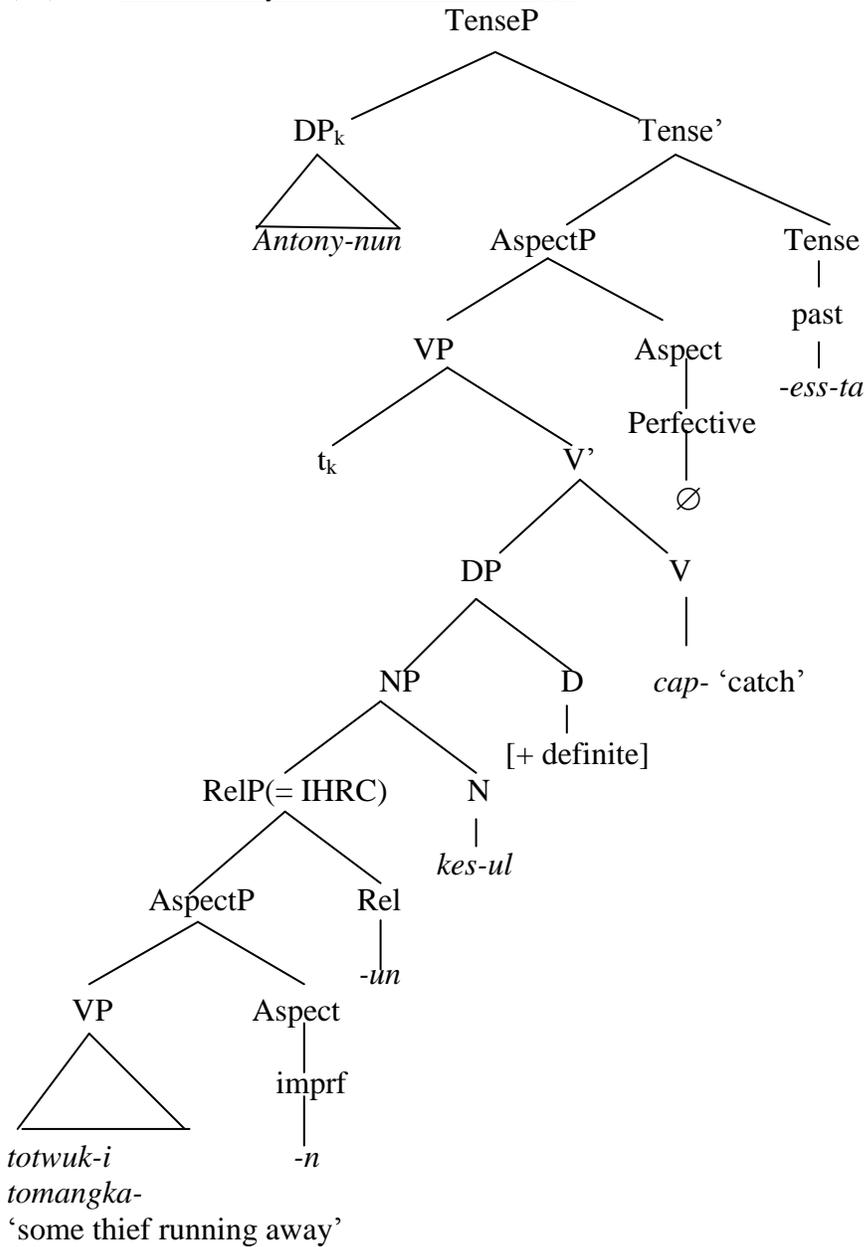　　　　　　　　　　　　　　　　　　　　　　　　　(adapted from Sohn 1995: 138, (9b))

(36)　　The IHRC construction in Korean:
　　　　Cleopatra-nun　　[[Antony-ka chayk-ul　　**ilk-n**]-un　　　kes]-ul ilkessta.
　　　　C.-top　　　　　[[A.-nom　book-acc　**read-imprf**]-rel kes]-acc read
　　　　**Possible**: 'Cleopatra read the book which Antony <u>was</u> reading (<u>at that time</u>).'
　　　　**Not possible**: 'Cleopatra read the book which Antony <u>is</u> reading (<u>right now</u>).'

Since full clauses with Tense Phrases can bear their own temporal index, this peculiar property of the embedded clause of the IHRC construction is taken to evidence its small clause structure, despite the fact that there seems to be no *prima facie* morpho-syntactic difference between the embedded clause of an IHRC and that of an EHRC.[18]

　　This small clause analysis of the embedded clause, together with the aforementioned assumptions about the syntactic structure of the IHRC+*kes*/*no* string and the VP-internal subject hypothesis (e.g., Fukui and Speas 1986), yields (38) as the overt syntactic structure for sentence (2).
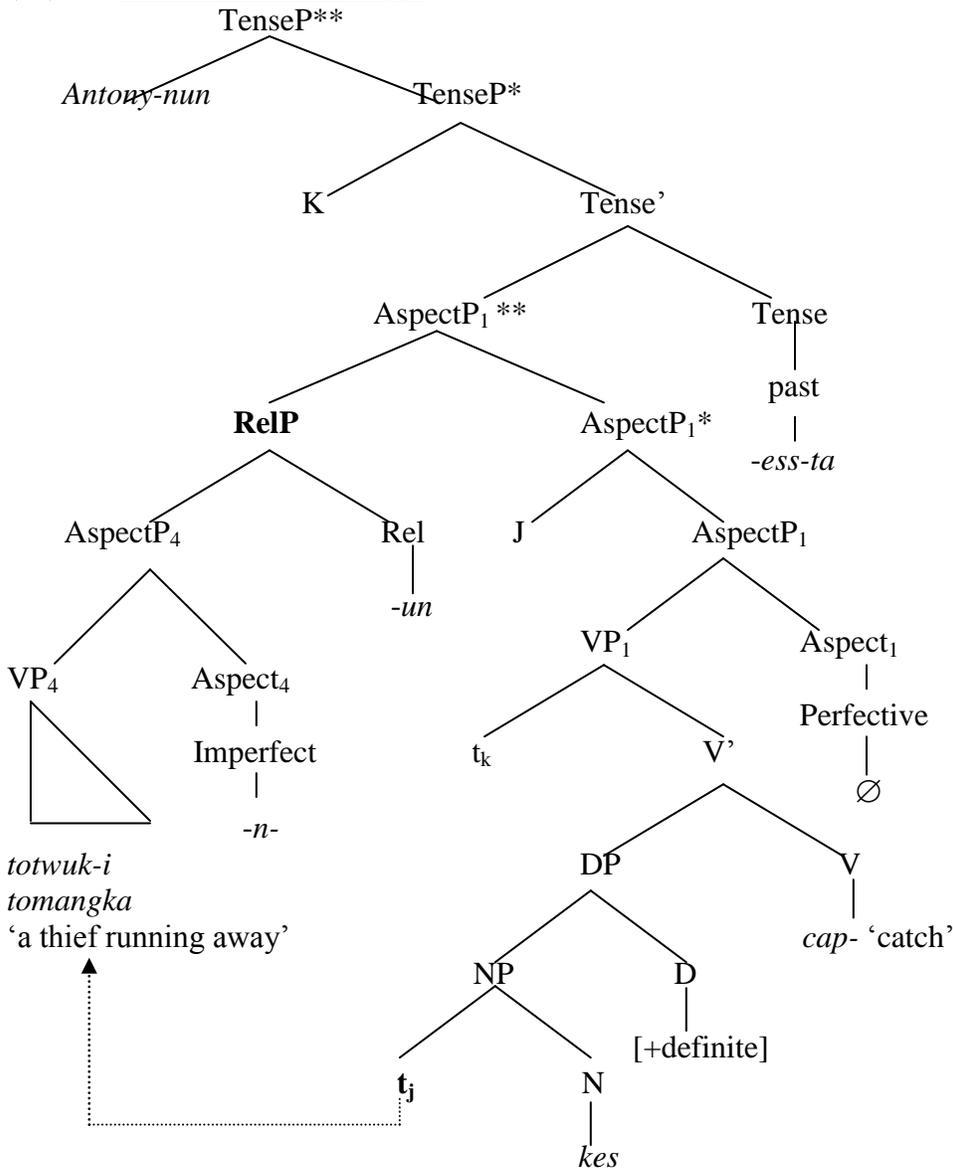
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[18] This means that I posit Tense Phrase inside the embedded clause of an EHRC even though no tense marking seems to be overtly realized.

(38)  The overt syntactic structure of (2):

```
                              TenseP
                     ┌───────────┴───────────┐
                   DPₖ                      Tense'
                    △              ┌──────────┴──────────┐
                Antony-nun      AspectP                Tense
                            ┌──────┴──────┐              │
                           VP           Aspect          past
                        ┌───┴───┐         │              │
                       tₖ      V'      Perfective     -ess-ta
                           ┌───┴───┐       │
                          DP       V       ∅
                      ┌────┴────┐   │
                     NP        D   cap- 'catch'
                 ┌────┴────┐    │
           RelP(= IHRC)    N  [+ definite]
            ┌────┴────┐    │
        AspectP      Rel  kes-ul
     ┌─────┴─────┐    │
    VP         Aspect -un
    △            │
 totwuk-i      imprf
 tomangka-       │
               -n
```

'some thief running away'

Following common practice in generative grammar, I assume that the LF structure serves as the input for the semantic computation. I further posit that, due to a semantic type mismatch, an IHRC raises at LF to the embedding clause's Aspect Phrase, as in (39) (more on this in section 4.2). Here, K and J are the indices of the subject and the IHRC, and $t_k$ and $t_j$ are their traces.

(39)    The LF structure of (2):

```
                          TenseP**
                    ┌────────┴────────┐
              Antony-nun          TenseP*
                              ┌───────┴───────┐
                              K            Tense'
                                      ┌───────┴───────┐
                                AspectP₁**          Tense
                              ┌──────┴──────┐         │
                           RelP        AspectP₁*     past
                        ┌────┴────┐    ┌────┴────┐    │
                   AspectP₄    Rel    J      AspectP₁  -ess-ta
                  ┌────┴───┐    │          ┌────┴────┐
               VP₄      Aspect₄  -un      VP₁      Aspect₁
                │          │         ┌────┴───┐      │
                △       Imperfect   tₖ      V'    Perfective
            totwuk-i       │              ┌───┴───┐     │
            tomangka      -n-            DP       V      ∅
      'a thief running away'         ┌───┴───┐    │
                                    NP       D   cap- 'catch'
                                 ┌──┴──┐     │
                                tⱼ     N  [+definite]
                                       │
                                      kes
```

In the literature, resorting to an LF-raising of an IHRC as a way of fulfilling semantic needs is not unprecedented (e.g., Fuji 1998, Shimoyama 1999). Yet the analysis proposed here differs from the existing analyses in several important respects. First, while the existing analyses assume that an IHRC raises all the way up to the topmost level of the embedding clause, it is argued here that it raises only up to the Aspect Phrase level (for reasons to be spelled out in section 4.2). Second, unlike Fuji (1998), who claims that the entire IHRC+*kes/no* string undergoes LF-raising, I assume with Shimoyama (1999) that only an IHRC raises, leaving *kes/no* in its base-position. In so doing, I account for the dualistic semantic contribution of an IHRC, namely, that a part of its meaning seems to serve as an argument of the embedding predicate and another part of it is felt to restrict the content of the embedding clause, as observed by Kuroda (1992) and Y. Kim (2002),

among others. The present analysis also diverges from Shimoyama's analysis, however: while Shimoyama assumes that the trace of a raised IHRC has no semantic contribution, we propose below that it is interpreted as denoting a state variable that combines with the denotation of *kes*/*no* and thereby contributes to resolving the formal linking problem presented by the IHRC construction.

### 4.2. The semantics of the IHRC construction

According to the syntactic structure of the IHRC construction outlined in the previous section, what has been hitherto called the E-type pronoun present in the construction is a DP argument of the embedding clause's predicate that consists of [+definite] feature and a NP which is headed by a N-level pronominal *kes*/*no*. Also, what has been called an IHRC is a RelP that consists of a relative marker *–un* or $\varnothing$ and an Aspect Phrase. Finally, what has been referred to as the embedded clause is an Aspect Phrase. This suggests that giving a compositional semantic analysis of the IHRC construction amounts to spelling out the semantic contribution of each of the following morpho-syntactic components:

(i)     the [+definite] feature
(ii)    The N-level pronominal *kes*/*no*
(iii)   the embedded clause or Aspect Phrase
(iv)    the relative marker *–un* or $\varnothing$

The remainder of this subsection is therefore devoted to proposing the lexical entry for each component and their compositional scheme. It also aims to pinpoint what is responsible for the licensing condition of the E-type pronoun summarized in (34). The upshot of the proposal will be that (i) the N-level pronominal *kes*/*no* relates the state described by the embedded clause to a salient individual in it and thereby produces a set of properties that serves as the descriptive content for the E-type pronoun, and (ii) an IHRC has the semantics of a generalized quantifier over functions from states to sets of times and this is due essentially to the semantics of progressive aspect and perfect aspect.

### 4.2.1. The semantics of [+definite]: contribution of uniqueness/maximality

I assume with Shimoyama (1999) that the [+definite] feature is what is responsible for the uniqueness or maximality effect that is often exhibited by the E-type pronoun. To put in more formal terms, this feature takes a contextually salient property of individuals and delivers the unique or maximal individual that has that property, as given in (40) (see also see Kadmon 1987, Jacobson 1995).

(40)    <u>Lexical entry for the definite feature:</u> <<e, t>, e>
        $[[+\text{definite}]] = \lambda P.\sigma x[P(x)]$, where $P$ ranges over properties of individuals and '$\sigma$' represents the sum operator in the sense of Link (1983).

To apply this lexical entry of [+definite] to sentence (2), the DP object of the embedding clause translates roughly as 'the unique or maximal individual that has a salient property $P$'. Given the syntactic structure assumed here, the value of this property variable will come from the denotation of the NP that consists of a RelP and *kes*.

*4.2.2. The semantics of* kes/no*: a relation from states to individuals*

I propose that *kes/no* recovers a salient thematic relation between states and individuals. This is based upon our observation in section 3.1 that a sentence instantiating the IHRC construction is not interpretable unless the antecedent of the E-type pronoun bears a thematic role in the state described by the embedded clause. Since thematic roles are standardly analyzed as relating eventualities to their participants (Parsons 1990, Landman 2000), it is conceivable that the denotation of *kes/no* relates a state described by the embedded clause to a salient individual in that state. I further claim that the pronominal makes yet another semantic contribution: its denotation recovers a salient property that holds true of individuals that bear a salient thematic role in the state described by the embedded clause. This idea is motivated by the fact that a sentence instantiating the construction cannot be interpretable unless the logical structure of the embedded clause contains a salient property that restricts the value of the E-type pronoun (unless the pronoun refers to a proper name), as we observed in section 3.2. Putting these ideas together, I propose (41) as the lexical entry for *kes/no*.

(41)     Lexical entry for *kes/no*: <s, <e, t>>

$[[kes_{R,\ P}]]^g = \lambda s_s.\lambda x_e[g(R)(x)(s)\ \&\ g(P)(x)]$, where *s* ranges over states, *x* over individuals, *R* over thematic relations such as Agent and Theme, and *P* over properties, and *g* is an assignment function.

The proposed lexical entry for *kes/no* can readily capture the discourse anaphoric property of the E-type pronoun present in the embedding clause, because it contains two free variables *R* and *P* whose values come from a contextually given assignment *g*. It also captures the delimited semantic variability of the pronoun, because the value of the relation variable *R* has to be among the possible thematic relations that hold between a state that is bound by a lambda operator and a salient individual in it. (I show exactly how the state variable gets bound by a lambda operator in section 4.2.4.)

*4.2.3. The semantics of the embedded clause: a function from states to sets of times*

I submit that the embedded clause denotes a function from states to sets of times which gets related to the Aspect Phrase level denotation of the embedding clause (more on this in section 4.2.4). Under the present analysis, the embedded clause consists of an Aspect Phrase. Hence, treating the embedded clause as denoting a function from states to sets of times is tantamount to treating an Aspect Phrase as denoting a function from states to sets of times. Below I provide justification for this analysis and spell out the lexical entries for each type of Aspect.

Analyzing Aspect Phrase as denoting functions from states to sets of times draws upon both Kratzer's (1998) and Parsons' (1990) treatments of Aspect. According to Kratzer, Aspect mediates between events and times by relating the event/situation time to the topic time (see also Klein 1992), as formally represented in (42).

(42)     Denotations of Three Types of Aspect proposed by Kratzer (1998: 107):
         a. **Imperfective**:  $\lambda Q_{<l,\ <w,\ t>>}.\lambda t_i.\lambda w_w.\exists e[t \subseteq \tau(e)\ \&\ Q(e)(w) = 1]$
                        'the topic time <u>included</u> in the event time'

b. **Perfect**: $\lambda Q_{<l,\,<w,\,t>}.\lambda t_i.\lambda w_w.\exists e[\tau(e) < t\ \&\ Q(e)(w) = 1]$
'the event time <u>precedes</u> the topic time'

c. **Perfective**: $\lambda Q_{<l,\,<w,\,t>}.\lambda t_i.\lambda w_w.\exists e[\tau(e) \subseteq t\ \&\ Q(e)(w) = 1]$
'the event time <u>included</u> in the topic time'

Here, *l* is a type for events, *w* for worlds, *t* for truth-values, and *i* for times and, and $\tau$ stands for 'runtime'.

On the other hand, as mentioned in section 3.1, Parsons claims that some types of Aspect introduce a state (rather than relating events directly to times): progressive (or imperfective) aspect introduces an in-progress state, which holds true of all event participants during the time interval in which the event described by the sentence is in development. Perfect aspect on a telic predicate describes a target state, which describes the temporary state of a (incremental) theme argument after the culmination of the event described by the sentence. Perfect aspect also describes a resultant state, which comes about regardless of the type of the predicate of the sentence and which presumably describes the permanent state of the Agent after the culmination of the event, given the hypothesis I put forward in section 3.1.

Although Kratzer's and Parsons' theories of Aspect have different consequences for linguistic theorizing, they are not incompatible. We can therefore combine them and hypothesize that the semantic contribution of some types of Aspect is to take the set of events denoted by a VP and return a function from states to sets of times.

If we apply this new treatment of Aspect to the progressive while abstracting away from its subtle differences from the imperfective, we can posit that it denotes a function from sets of events to functions from states to sets of times. We can further assume that it introduces an in-progress state which holds true of every individual that bears some thematic relation to the event described by the clause and which holds during the runtime of the event. This is based upon the intuition that an in-progress state describes the state of all event participants during the time interval in which the event described by the sentence is in development. Formalizing these ideas, I propose (43-45).

(43)   <u>Amended lexical entry for the imperfective:</u>[19] $<<l, t>, <s, <i, t>>>$

[[Imprf]] = $\lambda Q_{<l,t>}.\lambda s_s.\lambda t_i.\exists e[Q(e)\ \&\ \text{In-progress}(s, e)\ \&\ t \subseteq \tau(s)]$
Here, *l* is a type for events, *s* for states, *t* for truth-values, and *i* for times and, and $\tau$ stands for 'runtime'.

(44)   <u>Axiom regarding the temporal relation expressed by imperfective:</u>

$\forall s.\forall e[\text{In-progress}(s, e) \rightarrow \tau(s) = \tau(e)]$
(An event and its in-progress state are <u>contemporaneous</u>.)

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[19] For the sake of simplicity, here and throughout, I adopt an extensional semantics for the new treatment of Aspect and thus do not postulate a world variable inside the lexical entry for each type of Aspect.

(45)     Axiom regarding thematic roles:

$\forall s.\forall e[\text{In-progress}(s, e) \rightarrow \forall R\ [\text{theta-role}(R) \rightarrow \forall x[R(x)(s) \leftrightarrow R(x)(e)]]]$
(An event and its in-progress state have <u>identical</u> thematic roles, with <u>identical</u> values.)

   Turning now to the perfect, I posit that, just like the progressive, it also takes sets of events and returns functions from states to sets of times, but the states it introduces hold immediately after the culmination of the original event, rather than during its development. I also differentiate between the perfect that describes a target state (Perfect$_T$) and the one that describes a resultant state (Perfect$_R$). This is to accommodate the fact that the acceptability of a sentence embedding an IHRC varies depending on whether the relative clause describes a target state or a resultant state, as we saw in section 3.1, because, while a target state holds true of the theme argument of the original event, a resultant state holds true of the agent argument. Therefore, I propose (46-48) as the lexical entries for the two types of perfect and the axioms on them.

(46)     <u>Amended lexical entry for the perfect:</u> $<<l, t>, <s, <i, t>>>$
   a.   $[\![\text{Prf-T}]\!] = \lambda Q_{<l,t>}.\lambda s_s.\lambda t_i.\exists e[Q(e)\ \&\ \text{Target}(s, e)\ \&\ t \subseteq \tau(s)]$
   b.   $[\![\text{Prf-R}]\!] = \lambda Q_{<l,t>}.\lambda s_s.\lambda t_i.\exists e[Q(e)\ \&\ \text{Resultant}(s, e)\ \&\ t \subseteq \tau(s)]$
   Here, *l* is a type for events, *s* for states, *t* for truth-values, and *i* for times and, and $\tau$ stands for 'runtime'.

(47)     <u>Axioms regarding the temporal relations expressed by the perfect:</u>
   a.   $\forall s.\forall e[\text{Target}(s, e) \rightarrow \tau(s) > \tau(e)]$
        (The target state of an event is <u>after</u> it.)
   b.   $\forall s.\forall e[\text{Resultant}(s, e) \rightarrow \tau(s) > \tau(e)]$
        (The resultant state of an event is <u>after</u> it.)

(48)     <u>Axioms regarding thematic roles:</u>
   a.   $\forall s.\forall e\ [\text{Target}(s, e) \rightarrow \forall x[\text{Theme}(x)(s) \leftrightarrow \text{Theme}(x)(e)]\ \&\ \forall R\ [\text{theta-role}(R)$
        $\&\ R \neq \text{Theme} \rightarrow \neg\exists x.R(x)(s)]]$
        (The target state of an event has a Theme which is the same as the event's Theme, and it has no other theta-roles.)
   b.   $\forall s.\forall e[\text{Resultant}(s, e) \rightarrow \forall x[\text{Theme}(x)(s) \leftrightarrow \text{Agent}(x)(e)]\ \&\ \forall R\ [\text{theta-role}(R)$
        $\&\ R \neq \text{Theme} \rightarrow \neg\exists x.R(x)(s)]]$
        (The resultant state of an event has a Theme which is the same as the event's Agent and it has no other theta-roles.)

   When it comes to the perfective, I assume that it continues to have the denotation proposed by Kratzer (1998). That is, unlike the progressive or the perfect, it does not introduce a state argument. There are two reasons for maintaining this more customary treatment. One is that the embedded clause of the IHRC construction never seems to have perfective aspect: as the lexical entry given in (41c) indicates, the perfective locates the event time inside the topic time. For instance, the matrix clause of the English sentence

*While Mary was doing the dishes, John ate up the whole cake* contains the perfective, because, here, the runtime of the event in which John ate up the cake is included in the topic time, namely, the runtime of the event in which Mary did the dishes, since the eating event was complete sometime during the dish-washing event. Interestingly, in the case of sentences instantiating the IHRC construction, the event time of the embedded clause invariably precedes the topic time, namely, the time of the embedding clause, rather than being included in it, as observed by Fuji (1998). Since locating the event time before the topic time is a defining property of the perfect, as shown in (41b), we can safely assume that the embedded clause of an IHRC can contain the perfect but not the perfective. Another reason for adopting the Kratzer-style treatment for the perfective is that, as far as I can see, there is no evidence that it also describes some type of state in a manner analogous to the progressive or the perfect.[20] On the basis of this reasoning, I posit (49) as the lexical entry for the perfective (prfv).

(49)    Lexical entry for the perfective: $<<l, t>, <i, t>>$
        $[[Prfv]] = \lambda Q_{<l,t>}.\lambda t_i.\exists e[Q(e) \& \tau(e) \subseteq t]$
        Here, $l$ is a type for events, $t$ for truth-values, and $i$ for times and, and $\tau$ stands for 'runtime'.

Under the proposed treatment of Aspect, there arises a semantic type mismatch when an Aspect Phrase hosting either the progressive or the two types of perfect combines with Tense. This is because, while the former is of type $<s, <i, t>>$, denoting a function from states to sets of times, the latter is of type $<<i, t>, t>$, denoting a function from sets of times to truth-values. To circumvent this problem, I assume that Existential Closure (EC) in the sense of Heim (1982) saturates the state argument inside the denotation of Aspect Phrase before it combines with Tense. When it comes to computing the embedded clause, however, there will be no need for EC, because it does not contain Tense Phrase and, furthermore, the relativizer will have the right type to make the semantic computation proceed as desired.

*4.2.4. The semantics of the relative marker: a function from a function from states to sets of times to a function from states to sets of times*
        I claim that the relativizer (REL) takes *the function from states to sets of times* denoted by the embedded clause and returns a function that takes *the function from states to sets of times* denoted by Aspect Phrase of the embedding clause and maps it onto a set of times, as formally represented in (50).

(50)    Lexical entry for REL: $<<s, <i, t>>, <<s, <i, t>>, <i, t>>>$
        $[[[REL]] = \lambda K_{<s, <i, t>>}.\lambda L_{<s, <i, t>>}.\lambda t_i.\exists s[K(s)(t) \& L(s)(t)]$
        Here, $K$ and $L$ range over sets of states, $s$ over states, and $t$ over times.

Given this lexical entry, the first argument of REL will be the denotation of the embedded clause and then the second argument will be the denotation of the embedding clause's Aspect Phrase. But this computation will not be possible if we assume that the

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overt syntactic structure of a sentence is identical to its LF structure, because the sister of RelP would be *kes*/*no*, which cannot combine with the denotation of RelP, due to its semantic type being $\langle s, \langle e, t \rangle \rangle$.

In order to resolve this type mismatch problem, I hypothesize that, at LF, RelP raises and adjoins to the Aspect Phrase of the embedding clause, leaving a trace in its base-position. Since an Aspect Phrase is assumed to denote a function from states to sets of times, raising RelP at LF will give us the composition scheme we need; if the Aspect of the embedding clause happens to be perfective, as in (2), then predicate abstraction over the state variable denoted by the trace of the raised IHRC will produce the right type, as will be shown momentarily.

The proposed LF-raising analysis is motivated primarily by a semantic type mismatch between RelP and *kes*/*no*, but it has several welcome results. First, it helps to resolve the formal linking problem presented by the IHRC construction. Given the assumptions of type theory (Klein and Sag 1985), the trace of RelP gets interpreted as a state variable, because it has to saturate the first argument of the denotation of *kes*/*no*. Under the common assumption that movement creates an index node that abstracts over the denotation of the trace of the moved constituent (Heim and Kratzer 1998), the state variable inside the denotation of *kes*/*no* will end up receiving the same value as the state introduced by the Aspect of the embedded clause. Crucially, this will delimit the value of the free relation variable *R* inside the denotation of *kes*/*no* and thereby derive the effects of the first two licensing conditions on the E-type pronoun given in (34), namely, that the E-type pronoun must refer to an individual that bears some salient thematic role in a state described by the embedded clause. The proposed binding configuration will also delimit the value of the free property variable *P* inside the denotation of *kes*/*no*, bringing about the effect of the third condition, namely, that the logical structure of a sentence instantiating the IHRC construction must contain a property that can serve as the descriptive content of the E-type pronoun.

Let me demonstrate how the proposed system brings about these effects by deriving the meaning of sentence (2), based upon its LF structure given in (38). To begin with what happens inside the embedded clause, $VP_4$ denotes a set of events in which some (specific) thief is running away. This set of events combines with the denotation of $Aspect_4$, resulting in a set of in-progress states, and this set of states combines with the denotation of the relative marker –*un*, yielding a function from sets of states to sets of times. Turning to what happens outside the embedded clause, the RelP raises to the Aspect Phrase of the embedding clause, leaving a trace in its surface position, and this trace gets interpreted as a state variable that saturates the denotation of *kes*. Raising the RelP creates an index node J underneath the raised position and predicate abstraction occurs at this point over the state variable denoted by the trace of the moved constituent. This makes $AspectP_1$* denote a set of states. The newly created set of states combines with the denotation of RelP at $AspectP_1$**, yielding a set of times. This set of times combines with the denotation of Tense, returning a truth-value. At the level of TenseP, predicate abstraction occurs over the entity variable denoted by the trace of the raised subject, creating a set of individuals. This newly created set of individuals combines with the embedding clause's subject at TenseP*, saturating the entity variable and yielding a truth-value.

Given this composition scheme, when we apply the lexical entry for each node, we obtain (51) as the logical structure or truth-conditions for (2).

(51)    Logical structure of (2):
        $\exists t[t < \text{now} \ \& \ \exists s[\exists e[\exists x[\text{run.away}(e) \ \& \ \text{Agent}(x)(e) \ \& \ \text{thief}(x)] \ \&$
        $\text{In-progress}(s, e) \ \& \ t \subseteq \tau(s)] \ \& \ \exists e'[\text{catch}(e') \ \& \ \text{Agent}(\text{Antony})(e') \ \&$
        **$\text{Theme}(\sigma x[g(R)(x)(s) \ \& \ g(P)(x)])(e')$** $\& \ \tau(e') \subseteq t]]]$

In this logical structure, the highlighted part corresponds to the denotation of the E-type pronoun present in the embedding clause. Given the axioms on in-progress states in (44) and (45), and also given the embedded clause's content, the assignment function *g* renders 'Agent' and 'thief' as the values of *R* and *P*, respectively. This makes the E-type pronoun construed as referring to 'the unique individual that is in the in-progress state of the event described by the embedded clause and has the property of being a thief', namely, the thief.

Postulating LF-raising of an IHRC also captures the temporal dependency of the embedded clause on the embedding clause mentioned over (35) and (36). If we assume that Tense takes a set of times and maps it onto truth-values, the result of combining an IHRC and the embedding clause's Aspect Phrase will saturate the argument of Tense. This computation will ensure that the temporal variable inside the denotation of the embedded clause gets bound by the same operator as the temporal variable inside the denotation of the embedding clause, as shown in (52).

(52)    Logical structure of (36):
        **$\exists t[t$** $< \text{now} \ \& \ \exists s[\exists e[\exists x[\text{read}(e) \ \& \ \text{Agent}(\text{Antony})(e) \ \& \ \text{book}(x)] \ \&$
        $\text{In-progress}(s, e) \ \& \ \textbf{t} \subseteq \tau(s)] \ \& \ \exists e'[\text{read}(e') \ \& \ \text{Agent}(\text{Cleo})(e') \ \&$
        $\text{Theme}(\sigma x[g(R)(x)(s) \ \& \ g(P)(x)])(e') \ \& \ \tau(e') \subseteq \textbf{t}]]]$

By the same reasoning, we can also account for why, unlike an EHRC, an IHRC restricts the content of the embedding clause by specifying its time, even though it is base-generated inside a nominal argument of the embedding predicate, as mentioned in section 1—that is, why it can receive a 'when' clause interpretation. Such an interpretation is available for an IHRC precisely because the temporal variable inside the denotation of the embedded clause gets bound by the same operator as that of the embedding clause and, also, the content of the embedded clause serves as the restrictor of the quantifier denoted by REL and the event-level denotation of the embedding clause serves as its nuclear scope. An EHRC does not display such an interpretive behavior, by contrast, because it presumably has its own Tense node, despite the lack of overt morphology, and it is also interpreted *in-situ*, combing with the head noun's denotation, rather than raising to a higher position of the embedding clause.

### 4.3. Application to more complex cases

Let us turn now to more complex sentences that instantiate the IHRC construction and illustrate how the proposed semantic analysis derives their interpretations.

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*4.3.1. A progressive IHRC with a more complex structure*

To begin with a case that is slightly more complex than (2), take (53), which is a minimal modification of (19). In this sentence, the event described by the embedded clause has progressive aspect but it has more than one event participant and hence the sentence can receive at least three interpretations, depending on who, among the girl, the actress, and the boy, is considered prominent in the discourse context.

(53)     John-un         [[**sonye$_i$**-ka  **sonyen$_j$**-ul       **ku**        **alumtawun**
          J.-top          [[**girl**.-nom   **boy-acc**             **that**       **beautiful**
          **yepaywu$_k$**-ekey   sokayha-ko        iss-n]-un            kes]-ul
          **actress**-dat         introduce-comp  cop-imprf]-rel      kes]-acc
          (takaka-se)       kkyean-∅-ass-ta.
          (approach-and)    hugg-prf-pst-decl
          'Some specific girl$_i$ was introducing some specific boy$_j$ to some specific beautiful actress$_k$ and John hugged <u>her$_{i/k}$</u> or him$_j$.'

Under the proposed analysis, the way in which (53) is interpreted is essentially identical to the way in which (2) is interpreted. Unlike the latter, however, the logical structure of the former provides as many as three possible values for both *R* and *P* inside the denotation of *kes*, namely, Agent, Theme, and Goal for the former, and girl, boy, and beautiful actress for the latter, as shown in (54). The reason for this ambiguity is that the in-progress state described by the embedded clause holds true of all the three participants of the event from which it is derived.

(53)     <u>Logical structure of (54):</u>
          $\exists t[t < now$ & $\exists s[\exists e[\exists x \exists y \exists z[introduce(e)$ & **Agent**$(x)(e)$ & girl$(x)$ &
          **Theme**$(y)(e)$ & boy$(y)$ & **Goal**$(z)(e)$ & beautiful$(z)$ & actress$(z)]$ & In-
          progress$(s, e)$ & $t \subseteq \tau(s)]$ & $\exists e'[hug(e')$ & Agent(John)$(e')$ &
          **Theme($\sigma x[g(R)(x)(s)$ & $g(P)(x)])(e')$** & $\tau(e') \subseteq t]]]$

Given the three possible values for *R* and *P*, the E-type pronominal DP object of the embedding clause can receive any of the following interpretations:

(55)     <u>Interpretation of the E-type pronoun of (53):</u>
          a. $\sigma x[Agent(x)(s)$ & *x is a girl*]
          b. $\sigma x[Theme(x)(s)$ & *x is a boy*]
          c. $\sigma x[Goal(x)(s)$ & *x is a beautiful actress*]

Consequently, the sentence can be judged grammatical as long as John hugged the girl, the boy, or the actress who is in the in-progress state of the event described by the embedded clause—that is, while the girl was introducing the boy to the beautiful actress.

*4.3.2. IHRCs with perfect aspect*

As for cases in which the embedded clause has perfect aspect, we can revisit (8) and (9) and account for their contrast in more formal terms. The sentences are repeated for

convenience, with a more fine-grained morpheme analysis of the embedded clause's predicates than in Hoshi 1995.

(8)　　Yamada-san-wa　[[otonari-no　　musukosan-ga　**wakai**　　**oyomesan**-o
　　　　Y.-hon-top　　　[[next.door-gen　son-nom　　　**young**　　**bride**-acc
　　　　**morratta**]-∅　　no]-o　　　　tyoonai-no　　　　huzinkai-ni
　　　　**get.prf**]-rel　　no]-acc　　　neighborhood-gen　　women's club-dat
　　　　anyuusiyootosita.
　　　　tried to talk into joining
　　　　'The next door neighbor's son <u>got a young bride</u> and Ms. Yamada tried to talk
　　　　her (= the young bride) into joining the women's club in the neighborhood.'

(9)　　**\*Yamada-san-wa　[[otonari-no　　musukosan-ga　**kekkonsi-ta**]-∅　no]-o
　　　　Y.-hon-top　　　[[next.door-gen　son-nom　　　**marry.prf**]-rel　no]-acc
　　　　tyoonai-no　　　　huzinkai-ni　　　　kanyuusiyootosita.
　　　　neighborhood-gen　women's club-dat　　tried to talk into joining
　　　　Intended: 'The next door neighbor's son <u>got married</u> and Ms. Yamada tried to
　　　　talk her (= his wife) into joining the women's club in the neighborhood.'

Under the proposed analysis, the embedded clause of (8) receives the interpretation given in (56). This is because it has a telic predicate with perfect aspect, i.e., Perfect$_T$, and hence describes the target state of the theme argument of the original event, namely, Ms. Yamada's neighbor's son's wife or the bride, after her husband brought her home.

(56)　　<u>Logical structure of the embedded clause of (8):</u>
　　　　λs.λt.∃e[∃x∃y[bring_home(e) & Agent(x)(e) & neighbor's_son(x)(yamada) &
　　　　Theme(y)(e) & **bride(y)(x)** & **young(y)**] & **Target(s, e)** & t ⊆ τ(s)]

Given this logical structure, when we interpret *kes*, the free relation variable *R* inside its denotation can receive 'Theme', as well as 'Agent', as its value. This interpretation, aided with the properties of individuals such as 'young' and 'bride', renders the E-type pronoun construed as referring to the unique individual which is the Theme of the target state described by the embedded clause and which has the property of being a young bride. Hence, the sentence is judged acceptable on the intended interpretation.

　　In the case of (9), on the other hand, the embedded clause also has perfect aspect but its predicate is atelic and hence it describes the resultant state of the agent argument, i.e., Ms. Yamada's neighbor's son, rather than the target state of the Theme argument, i.e., his wife. This is formally represented in (57), which is the result of applying Perfect$_R$ to the denotation of the embedded clause's VP.

(57)　　<u>Logical structure of the embedded clause of (9):</u>
　　　　λs.λt.∃e[marry(e)　&　∃x∃y[Agent(x)(e)　&　Theme(y)(e)　&　neighbor's
　　　　_son(x)(yamada)] & **Resultant(s, e)** & t ⊆ τ(s)]

This logical structure provides 'Agent' as the only possible value for the free variable *R* inside the denotation of *kes*. Consequently, the sentence can be judged good only if the E-

type pronoun refers to the groom. But this is not the intended interpretation of the sentence, and hence the ungrammaticality.

### 4.3.3. IHRCs without an overt NP antecedent for the E-type pronoun

Let us now apply the proposed analysis to (18), which exemplifies a case in which the sentence is judged more or less acceptable despite the absence of an overt antecedent of the E-type pronoun. The sentence is repeated from above.

(18)　?John-un　　[[paci-ka　　　　teleweci-∅]-un　kes]-ul　takkanay-ess-ta.
　　　　J.-top　　　[[pants-nom　　　get.dirty-prf]-rel　kes]-acc　wipe.out-pst-decl
　　　　Lit.: 'The pants got dirty and John wiped <u>the dirt</u> off the pants.'

Under the present analysis, the embedded clause of this sentence receives the interpretation spelled out in (58).

(58)　　Logical structure of the embedded clause of (18):
　　　　$\lambda s.\lambda t.\exists e[\text{create}(e)$ & $\exists x\exists y[\text{Theme}(x)(e)$ & **Dirty(x)** & $\text{Location}(y)(e)$ & john's_pants$(y)]$ & **Target(s, e)** & $t \subseteq \tau(s)]$

The above logical structure contains all the ingredients that are needed for the intended interpretation: since the embedded clause has Perfect$_T$, its logical form contains a target state *s* which holds true of the incremental theme argument of the event from which it is derived. Furthermore, it also provides a salient property that holds true of that individual, namely, 'dirty'. Therefore, the free variables *R* and *P* inside the denotation of *kes* receive 'Theme' and 'dirty' as their values, rendering the E-type pronoun construed as referring to the dirty stuff that got onto John's pants.

### 4.3.4. A case where an overt NP antecedent of the E-type pronoun is required

Let us now revisit (29), which is also repeated for convenience. Recall that this sentence can be judged grammatical only when the nominal *kawai onna-to* 'pretty woman-with' is present in the embedded clause, despite the fact that the embedded clause describes an in-progress state that holds true of the intended antecedent of the E-type pronoun.

(29)　　Yamada-san-wa　[[otonari-no　　　musukosan-ga　　　**\*(kawaii　onna-to)**
　　　　Y.-hon-top　　　[[next.door-gen　　son-nom　　　　　**pretty　woman-with**
　　　　**kekkon.suru**]-∅　　　no]-o　　tyoonai-no　　　huzinkai-ni
　　　　**marriage.do.prog**]-rel　no]-acc　neighborhood-gen　women's club-dat
　　　　kanyuusiyootosita.
　　　　tried to talk into joining
　　　　Intended: 'The next door neighbor's son was <u>getting married to a pretty woman</u> (by having a wedding ceremony right then) and Ms. Yamada tried to talk <u>her (= the pretty woman)</u> into joining the women's club in the neighborhood.'

Under the present analysis, the embedded clause of this sentence receives the following interpretation.

(59)   Logical structure of the embedded clause of (29):
       λs.λt.∃e[marry(e)  &  ∃x∃y[Agent(x)(e)  &  neighbor's_son(x)(yamada)  &
       Concomitant(y)(e)] & In-progress(s, e) & t ⊆ τ(s)]

Given this logical structure, when we interpret the E-type pronominal object of the
embedding clause, we obtain two possible values for *R* inside its denotation, namely,
'Agent' and 'Concomitant', but only one possible value for *P*, namely, Ms. Yamada's
neighbor's son. This yields two possible interpretations for the object position, which are
spelled out in (60).

(60)a.   σ*x*[*Agent*(*x*)(*s*) & *x* is Ms. Yamada's neighbor's son]
    b.   σ*x*[*Concomitant*(*x*)(*s*) & *x* is Ms. Yamada's neighbor's son]

Of these two interpretations, (60b) gives the intended interpretation of the sentence. But it
is nonsensical, because the concomitant argument of the in-progress cannot be Ms.
Yamada's neighbor's son; it would make sense only if one can marry oneself. Hence, the
only possible interpretation for the E-type pronoun is the one given in (60a), in which it
refers to the son, not his wife.
   One might wonder why the value of *P* inside the denotation of *kes* cannot be some
salient property that is not overtly realized in the logical structure of the embedded clause.
I hypothesize that this is because a property that holds true of an implicit argument is
usually not salient and hence is difficult to recover from a non-linguistic context; if an
individual has a salient property, then it would not be made implicit to begin with.
Therefore, if the intended antecedent of the E-type pronoun is an implicit argument in the
eventuality described by the embedded clause and yet its property is not represented in
the logical representation, unlike the case in (18), then the sentence cannot be interpreted.

### *4.4. Summary*
   In this section I have developed a compositional semantic analysis of the IHRC
construction that derives the effects of the licensing condition on the E-type pronoun
summarized in (34). In so doing, I provided a solution to the formal linking problem of
the construction. What lies at the heart of the solution is that the denotation of the E-type
pronoun contains a state variable and this variable gets bound by the same lambda-
operator that binds the state variable introduced by the embedded clause. This result was
obtained by proposing a slightly novel treatment of progressive aspect and perfect aspect,
and LF-raising of an IHRC to the Aspect Phrase level of the embedding clause as a way
to resolve a semantic type mismatch.

### 5. SUMMARY AND CONCLUSION
   This paper has sought to achieve two goals. One was to clarify what counts as the
formal linking problem presented by the IHRC constructions in Japanese and Korean,
which refers to the fact that the E-type pronoun present in the embedding clause cannot

refer to just any prominent individual in the discourse context, despite its alleged discourse anaphoric status. The other was to provide a solution to the linking problem.

It has been shown that, unlike a typical E-type pronoun, the one present in the IHRC construction needs to satisfy the following conditions: the embedded clause describes a state that temporally overlaps with the eventuality described by the embedding clause and the intended antecedent of the E-type pronoun bears a thematic role in that state. Furthermore, the logical form of the embedded clause must contain a salient property that holds true of the intended antecedent of the E-type pronoun, whether it comes from an overtly realized NP or the predicate of the embedded clause. It was argued that the presence of this property is necessary to give the E-type pronoun its descriptive content.

We resolved the linking problem of the IHRC construction by proposing an event-based semantic analysis. The gist of the analysis was that the denotation of the E-type pronoun at issue contains free variables but their possible values are delimited by the binding relation that holds between the state variable inside the pronoun's denotation and the $\lambda$-operator that binds the state argument inside the embedded clause's denotation.

The proposed analysis has two important implications for linguistic theory. One is that there is an intimate relation between the semantics of some types of E-type pronoun and the event structure of the preceding clauses (see also Evans 1980, Heim 1990, Chierchia 1995, Elbourne 2001, 2005 for a similar implication). The other is that relativization can be employed as a strategy for connecting two eventuality descriptions, as well as connecting two predicates of individuals.[21] Taken together, these implications reveal that the IHRC constructions in Japanese and Korean provide a unique opportunity to investigate the role of pronominalization and relativization in event subordination.

This paper has also shown that there are several non-trivial differences between a typical E-type pronoun and the E-type pronoun that occurs in the IHRC construction. Since the former occurs across two independent sentences while the latter occurs inside a complex clause structure, their differences might boil down to differences between inter-sentential and intra-sentential pronouns. But they may also stem from the peculiar morpho-syntactic properties of the IHRC construction such as the lexical idiosyncrasies of *kes* or *no* which require the presence of a clausal complement that provides its descriptive content.[22] Obviously, these issues merit full investigation of their own and therefore are left for future research.

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[21] This implication receives further support from adjoined relatives in Walpiri, which also seem to display similar interpretive behavior to IHRCs in Korean and Japanese, given the findings in Hale 1976.

[22] For the lexical idiosyncrasies of *kes* and *no*, see, among others, Suh 1996, Takubo 2005, respectively.

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