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A Multiple Inheritance Analysis of the Internally-Headed Relative Clause in Japanese

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Abstract

This paper proposes a mutliple inheritance type-hierarchical analysis of the Japanese "Internally-Headed Relative Clause" (IHRC) in Head-driven Phrase Structure Grammar (HPSG). It has been a long standing issue whether the IHRC shares syntactic properties with the EHRC or it is basically a clausal complement structure. This paper claims that such bipartite debate is misguided. It is undeniable that IHRC is similar to EHRC in one respect, and to clausal complement clause in another. Defining it categorically as either one only distorts the reality. It will be proposed, therefore, that IHRC is a subtype of both a relative clause and a clausal complement. The hybrid structure of IHRC is quite a marked type of multiple inheritance, and I claim that this accounts for the restrictive availability of IHRC and its unstability as an independent grammatical construction, as well as for the IHRC's intermediacy between the EHRC and the clausal complement structure. This discussion is done on Japanese alone; however, the analysis with minor modifications will accommodate the Korean IHRC as well.

1. Introduction

This paper discusses the structure of the so-called "Internally-Headed Relative Clause" (IHRC) in Japanese in the constraint-based framework of Head-driven Phrase Structure Grammar (HPSG) and proposes a mutliple inheritance type-hierarchical analysis to account for the dual nature of the IHRC as well as for its restrictive availability.

There has been a long-standing debate regarding whether the IHRC is to be analyzed as a relative clause or as a clausal complement (Kim 1996, Kuroda 1992, Ohara 1996, Park 1994). Semantically speaking, the IHRC apparently modifies a noun, strongly analogous to the Externally-Headed Relative Clause (EHRC). Syntactically, however, it is quite distinct from the EHRC; it does not even have a syntactic nominal head which is the target of modification. Rather, the syntactic structure (on the superficial level at least) of the IHRC is identical with that of a clausal complement. This state of incongruity has led many researchers to assume a quasi-EHRC structure for the IHRC, positing empty categories for the missing syntactic head noun and other positions when necessary. Such relative clause analyses, however, fail to capture some differences between the IHRC and the EHRC. The clausal complement analysis, on the other hand, must explain why and how the IHRC refers to an entity involved in the event denoted by the clause (=entity-reading), while a clausal complement refers to an event as a whole (=event-reading). Park's (1994) analysis of the Korean IHRC leaves this essential question to some type of pragmatics, and Y-B. Kim's (1996) analysis contains crucial technical problems, to be shown in a note below. Thus the adequate analysis of the IHRC in Japanese is yet to be known.

The present paper claims that the bipartite debate regarding the identification of the IHRC is misguided. It is an undebatable fact that the IHRC is similar to the EHRC in one respect, and to clausal complement clause in another. Therefore, defining it categorically as either one distorts the reality. I claim that the IHRC in Japanese (and presumably in Korean) is a hybrid construction composed of the clausal complement structure and the relative clause structure, by exploiting the possibility of multiple-inheritance hierarchies. The hybrid structure of IHRC is quite a marked type of multiple inheritance, and I claim that this accounts for the unstability of IHRC as an independent grammatical construction.

This paper proceeds in the following way. The Japanese IHRCs will first be compared and contrasted with the EHRCs and clausal complements. Having confirmed the unstability of the IHRC interpretation, I will present the type hierarchical analysis of the IHRCs. Though my discussion is exclusively done on Japanese, I believe the analaysis will find equal applicability in languages like Korean as well.

A word is in order before we start so as to avoid confusion of terminology. Precisely speaking, IHRCs and EHRCs refer to the clauses without the nominal head. Following Sag (1996), I will refer to a relative

clause with a nominal head as a relative phrase. In what follows, terms *IHRC* and *EHRC* are used to refer to relative phrases only when no confusion is likely to occur. Otherwise, IHRC and EHRC are reserved for "clauses" and terms IHRC-phrase and EHRC-phrase are used when a nominal head is included.

2. IHRCs and Other structures

2.1. IHRCs and EHRCs

The sentences in (1) illustrate the Japanese IHRCs in question:

(1) a. Hanako -wa [[inu -ga hasitte-kita] -no] -o tukamaeta
top dog nom run-come-past NO acc catch-past
'Hanako caught the dog which came running.'
b. [[Hanako -ga tegami -o okutte-kureta] -no] -ga todoita
nom letter acc send-give-past NO nom arrive-past
'The letter which Hanako had sent arrived.'

The bracketed part refers to a nominal argument which is included in the bracketed part itself, *inu* 'dog' and tegami 'letter,' respectively. Along with these sentences, Japanese has a more usual type of relative clauses, or EHRCs, as well, which is exemplified in (2):

(2) a. Hanako -wa [[hasitte-kita] inu] -o tukamaeta
top run-come-past dog acc catch-past
'Hanako caught the dog which came running.'
b. [[Hanako -ga okutte-kureta] tegami] -ga todoita
nom send-give-past letter nom arrive-past
'The letter which Hanako had sent arrived.'

Both IHRCs and EHRCs have the "entity reading"; namely, both are taken to refer to an entity, which is shared by the embedded relative clause and the matrix clause. Different from EHRCs, IHRCs lack an overt referential head, and it is apparently "substituted for" by a lexical item no, as seen in (1).

Emphasizing the semantic similarities, many analyses of IHRC have assumed that the IHRC is syntactically similar to the EHRC as well. However, there are important differences between the constructions, and it is doubtful that they should really share a syntactic structure. One of such differences concerns the nature of modification; IHRCs do not restrictively modify the head noun but simply present a backgrounding event relevant to the entity (Park 1994, Ohara 1996). For instance, if someone is specifically asking for the identification of an entity with modifiers, only EHRCs can produce an appropriate answer.

(3) Dono kodomo -ga tukamatta-no?
which child nom be-caught-past-Q
'Which child was caught?'
a. -- [[Heya -kara detekita] kodomo] -ga tukamatta-yo.
room from come-out-past child nom be-caught
b. * -- [[Kodomo -ga heya -kara detekita] no] -ga tukamatta-yo.
child nom room from come-out-past NO nom be-caught
'The child who had come out of the room was caught.'

The temporal constraint also makes the Japanese IHRCs behave differently from EHRCs. The event denoted by IHRCs may temporally precede the event of the matrix clause, but not vise versa. Such constraint is missing with EHRCs. Consider the following examples:

(4) a. [[Yoko -ga suguni nusum-areru-kotoninatta] okane] -wo Taro -wa ginnkoukouza
nom soon steal-pass-be-to-happen-past money acc top bank account
-ni hurikonnda.
loc deposit-past
b. * [[Yoko -ga okane -wo suguni nusum-areru-kotoninatta] no] -wo Taro -wa
nom money acc soon steal-pass-be-to-happen-past NO acc top

ginnkoukouza -ni hurikonnda.
bank account loc deposit-past
'Taro put the money into Yoko's bank account, which was only to be stolen soon.'

These observations along with others seem to suggest that IHRCs are not inherently a modification structure. The noun modification interpretation does not always obtain. IHRCs certainly refer to an entity, and the proposition in the embedded clause certainly modifies the entity, but they are clearly deviant from the "prototypical" modification structure, in which the target noun is both syntactically and semantically a head.

2.2. IHRCs and Clausal Complements

IHRCs are also compared with a nominalized clausal complement structures. As far as the surface syntax is concerned, they are certainly identical. Compare the clausal complement structure in (5) with the IHRC in (1a) above:

(5) Hanako -wa [[inu -ga hasitte-kita] -no] -o sira-nakat-ta
top dog nom run-come-past NO acc know-neg-past
'Hanako didn't know that the dog came running.'

Notice that (1a) and (5) are exactly parallel in terms of their surface syntax. The only difference resides in the choice of the main verb. Semantically, however, they are contrastive in that the former refers to an entity involved in the embedded clause, while the latter refers to an event as a whole (i.e., event reading). Despite the clear contrast in meaning, the two structures are not unrelated to each other. Interestingly, IHRCs and clausal complements are in rough complementary distribution.

IHRCs are not compatible with a matrix verb when it is a verb of cognition other than that of 'seeing/finding':

(6) Hanako -wa [[inu -ga hasitte-kita] -no] -o sira-nakat-ta
top dog nom run-come-past NO acc know-neg-past
* 'Hanako didn't know the dog that came running.'
'Hanako didn't know that the dog came running.'

This type of cooccurrence restriction of IHRC is puzzling since there is no reason why (6) cannot mean "Hanako didn't know the dog which came running," i.e., analogous to the IHRC (1a). Sure enough, the corresponding EHRC is perfectly possible:

(7) Hanako -wa [[hasitte-kita] inu] -o sira-nakat-ta
top run-come-past dog acc know-neg-past
'Hanako didn't know the dog that came running.'

Notice that these sentences are interpreted as clausal complement structures when the desired IHRC reading is not available. In fact, clausal complements in event-reading occur mostly with verbs of cognition. In other words, when the matrix predicate is a verb of physical action, such as *tukamae* 'to catch,' and *todok* 'to reach,' the event reading (= the reading of clausal complement) is unavailable, and the entity reading of the IHRC is made available to save the situation. In view of this type of interdependence, it appears that IHRCs are not a stable construction in the grammar of Japanese but a "secondary" construction that is invoked only necessary. This is in strong contrast with the entity reading of EHRCs, which is always available so long as they take the form of the EHRC.[1]

3. The structure of IHRC: A Proposal

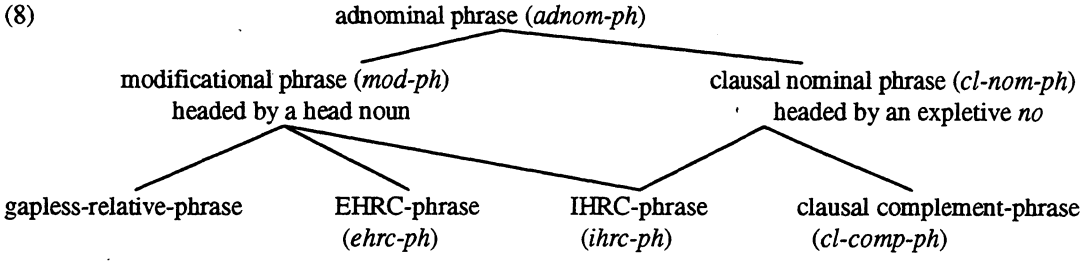
3.1. Type hierarchy of IHRCs

I claim in this paper that the IHRC is not exclusively a relative clause but partly a clausal complement as well. I claim this hybrid is done by multiple inheritance which refers to both of the structures. The inheritance mechanism was employed in earlier works of HPSG to eliminate redundancies in the lexicon. Words are assigned to specific types, and the types are sorted in a hierarchical way. For instance, some types are classified as subtypes of one supertype. Each type is declared to abide by certain constraints, and all

subtypes of one supertype must obey the constraints that govern the supertype. This system has made it possible to capture cross-classifying generalizations as well as expressing the idiosyncracies of individual subtypes. As the usefulness of the multiple inheritance was growingly recognized, its possibility was explored in other facets of grammar. Sag (1996), for instance, presents a type hierarchical approach to the grammar of clauses and phrases in the analysis of English relative clauses. It proposes that clausality and headedness are on distinct informational dimensions, and demonstrates how multiple inheritance type hierarchy factors out various kinds of information and interweave them together at the same time.

This paper proposes a type hierarchical analysis of the IHRC in Japanese. I assume the following type hierarchy of adnominal phrases in Japanese (cf. Cha 1997). I claim that both the modificational phrase and the clausal nominal phrase jointly serve as the supertypes of the IHRC-phrase in a rather special kind of the type-hierarchical relation.

(8)



The discussion proceeds in the following order. I will first examine the structure of no, and then the EHRC-phrase and the clausal complement structure will be discussed. The analysis of the IHRC-phrase will be presented at the end.[2]

3.2. Non-referential Pronominal *No*

Now, let us look more closely at the structures of IHRCs. They involve a morpheme *no*, whose syntactic status has never really been explained away. It is phonologically equivalent with a pronoun *no*, but it has been firmly established that the *no* in the IHRC is not a referential pronoun, though there are cases where the distiction is not clear-cut. (Kuroda 1992) A number of studies have provided the evidence that they are distinct. One of such evidence is that the referential pronoun *no* can be replaced by a content noun while the no in IHRCs cannot, as the following examples show:

(9) a. Yoko -wa akai kutu -wo katte, Hanako -wa siroi -no/kutu -wo katta.
top red shoe acc buy top white NO/shoe acc buy-past
'Yoko bought red shoes, and Hanako bought white ones/shoes.' (pron)

b. Hanako -wa [[kutu -o katta] -no/*kutu] -wo kokoni oite-itta.
top shoe acc buy-past NO/shoe acc here put-past
'Hanako left the shoes here which she bought.' (IHRC)

Secondly, referential pronoun *no*'s typically have a degrading connotation when used to refer to human beings, while such a degrading connotation is not observed with the IHRC *no*'s:

(10) a. Asoko -ni orare-ru senseigata -no uti, itiban se-no-hikui -*no/kata -wo oturesite-kure.
there loc is (hon) teachers gen among first tall NO/person acc bring-along
'Of the teachers over there, bring along the one who is the shortest (honorific).'(pron)

b. Asoko -ni sensei -ga tatte-orare-ta no -wo oturesita.
there loc teacher nom stand (hon) NO acc bring-along
'I brought along the teacher who was standing over there (honorific).'(IHRC)

Thus (10a) with a referential pronoun *no* is ruled out because the referent is a respectable person. The use of honorific forms and the degrading connotation associated with the pronoun *no* are clearly inconsistent, resulting in ungrammaticality.

If *no* is not a referential pronoun, what can it be? Considering the fact that it attaches to a clause and

refers to the event denoted by the clause, one may be tempted to define it as a complementizer or COMP. However, it is contrastive with other candidates of COMP such as *to*, in that the clause with *no* needs case marking, while the one with *to* is not, even when they have almost the same meaning:

(11) a. Hanako -wa [[inu -ga hasitte-kita] -no] -o sira-nakat-ta
top dog nom run-come-past NO acc know-neg-past
'Hanako didn't know that the dog came running.'

b. Hanako -wa [[inu -ga hasitte-kita] -to] sira-nakat-ta
top dog nom run-come-past COMP know-neg-past
'Hanako didn't know that the dog came running.'

This contrast indicates that the clause to which *no* is attached is a nominal phrase of some sort, while the one to which *to* is attached is not. To capture this contrast I suggest that the *no* is a very special type of noun. *No* is special in that it is syntactically affixational, i.e., it always occurs adjacent to a verb, and it is subcategorized for a clause (or a phrasal projection of the adjacent verb). Different from the pronominal *no* shown above, the *no* in question is crucially not referential, i.e., it is an expletive pronoun. The following shows the preliminary form of the structure of a clause headed by the expletive *no*. The details of the feature structure will be revised in the next section:

(12) clause-*no*

$$\begin{bmatrix} \text{HEAD} & \textit{noun} \\ \text{D-DTR} & \textit{non-ref} \\ \text{NON-HD-DTR} & \begin{bmatrix} \text{HEAD} & \textit{verb} \\ \text{CONT} & \textit{proposition} \end{bmatrix} \end{bmatrix}$$

3.3. EHRC-phrase structure

For the EHRC, I assume without discussion the structure analogous to that of the English non-wh relative clause (Sag 1996). It is headed by a verb undergoing the Argument Extraction Lexical Rule (AELR), which is an analog of the Compement Extraction Lexical Rule (CELR):[3]

(13) Argument Extraction Lexical Rule (AELR):

$$\begin{bmatrix} \textit{word} \\ \text{ARG-S} \quad [1] \quad \bigcirc \ \langle \text{gap} \rangle \end{bmatrix} \Rightarrow \quad \begin{bmatrix} \text{ARG-S} \quad [1] \end{bmatrix}$$

This rule removes an argument from the ARG-S feature and identifies the removed argument as being of type gap, which is constrained by further specifications for a gap. The difference between the CELR and the AELR is that the latter locates the extraction in the ARG-S feature instead of in the COMPS (or Valence) feature. A motivation for this revision will be given later.

Take an example of EHRC-phrases in (14):

(14) [[Kyoko -ga katta] hon]
nom buy book
'The book that Kyoko bought'

The verb *kaw* 'to buy', output of AELR, has a nonempty SLASH value, which corresponds to the head noun of the relative noun phrase, as in (15) below:

(15)
$$\begin{bmatrix} \text{HEAD} & \textit{verb} \quad \text{MOD} \ N_{[1]} \\ \text{CONT} & [2]\ \textit{proposition} \\ \text{ARG} & [4] \bigcirc [3] \\ \text{VAL} & [4] \\ \text{SLASH} & \{[3]NP_{[1]}\} \end{bmatrix}$$

The SLASH value is terminated at the clausal level. The EHRC (i.e., without the head noun) (e.g. *Kyoko ga*

katta) is to have the feature structure in (16):

(16) EHRC

$$\textit{ehr-cl} \Rightarrow \begin{bmatrix} \text{HEAD} & \textit{verb} \mid \text{MOD}_{[1]} \\ \text{CONT} & [2]\,\textit{proposition} \\ \text{VAL} & \langle\ \rangle \\ \text{HD-DTR} & [\text{SLASH}\ \{\text{NP}_{[1]}\}] \\ \text{SLASH} & \{\} \end{bmatrix}$$

Basically in line with Sag's (1996) analysis of the English non-*wh* relative clause, it has a MOD feature corresponding to the slash value of the head daughter.[4] This clause is considered to be of type *adnominal-clause*, which has the following structure. The MOD value corresponds to the head daughter noun when the clause combines with the head to form an adnominal (clausal complement) phrase:

(17) Adnominal clause

$$\textit{adnom-cl} \Rightarrow \begin{bmatrix} \text{HEAD} & \text{verb} \mid \text{MOD}\ \textit{noun} \\ \text{CONT} & \textit{proposition} \end{bmatrix}$$

I assume with Sag (1996) that the default value of MOD is none. The *adnom-clause* type overrides this default specification. MOD feature is a head feature, which, for one thing, dominates the morphological form of the verb in a modificational structure. This is to explain the data in languages where the verb takes a special ending when it precedes and modifies a noun. MOD feature is also expected to capture the semantic side of the structure, namely, that its value is the syntactic head as well as the target of modification. Note, however, that these two properties do not necessarily coincide with each other. That is, the verb ending does not necessarily specify the semantic target of modification. In Korean, for instance, the verb ending *-nun* marks the verb form of a relative clause preceding the nominal head. However, the same morphology is also used in a clause in a clausal nominal structure with an eventive interpretation, which does not semantically "modify" any nominal target. This shows that the verb morphology is simply an indicator of the syntactic property of the clause (i.e., it precedes a nominal head) and not an indicator of the semantic modification. In view of this, I claim in this paper that MOD feature specifies only its syntactic property. (In this sense, "MOD" feature is a misnomer.)[5]

When the EHRC combines with the head noun to constitute a relative phrase, the clause is the non-head daughter and contributes semantically by additionally specifying the meaning of the head noun. The following is the feature structure for the Japanese EHRC-phrase I propose:

(18) Japanese EHRC-phrase (to be revised)

$$\textit{ehrc-ph} \Rightarrow \begin{bmatrix} \text{HEAD} & \textit{noun} & & \\ \text{CONT} & \begin{bmatrix} \text{INDEX} & [2] & \\ \text{REST} & [3] \cup \{[4]\} \end{bmatrix} & & \\ \text{HD-DTR} & [1] & \begin{bmatrix} \text{INDEX} & [2] \\ \text{REST} & [3] \end{bmatrix} & \\ \text{NON-HD-DTR} & & \begin{bmatrix} \text{CONT} & [4]\textit{proposition} \\ \text{HEAD} & \textit{verb} \mid \text{MOD}\ [1] \end{bmatrix} \end{bmatrix}$$

This is again strongly reminiscent of the structure of the English relative phrase as proposed in Sag (1996). What this says is that the head daughter of the externally headed relative phrase is token identical with the value of the modification feature of the head verb of the EHRC (non-head daughter.) The CONTENT value is a restricted index whose restriction set is constructed by adding the relative clause's propositional content into the restriction set of the head daughter. Given the AELR, the value of the modification feature is token identical with the slashed argument of the head verb, the slash feature being terminated at the clausal level of EHRC.

3.4. Clausal Complement Structures

Now what about the structure of the clausal complement? I assume that the complement clause to be headed by no is not a simple declarative clause but is of *adnom-clause* type, just as the EHRC. That is, with relative clauses, it takes a non-empty value for the MOD feature, though the value is not shared by any

nonlocal feature.[6] The following shows the structure of the clausal complement phrase headed by no in the eventive reading:[7]

(19) Clausal complement phrase

cl-comp-ph =>
$$\begin{bmatrix} \text{HEAD} & \textit{noun} \\ \text{CONT} & [4] \\ \text{HD-DTR} & [1]\ \textit{non-ref} \\ \text{NON-HD-DTR} & \begin{bmatrix} \text{HEAD} & \text{verb} \mid \text{MOD}\ [1] \\ \text{CONT} & [4]\textit{proposition} \end{bmatrix} \end{bmatrix}$$

That is, it is a nominal phrase headed by an expletive noun. The semantic content of the whole phrase is a proposition, which is identified with the meaning of the non-head daughter clause. The head feature MOD is given on the non-head daughter clause.

I further assume that the clausal complement phrase is a subtype of a clausal nominal phrase, which covers both the clausal complemet phrase and the IHRC-phrase (or clausal relative phrase, for the better terminology). The following shows the structure of the supertype, clausal nominal phrase:

(20) Clausal nominal phrase (supertype for Clausal complement phrase)

cl-nom-ph =>
$$\begin{bmatrix} \text{HEAD} & \text{noun} \\ \text{HD-DTR} & \begin{bmatrix} [1]\ \textit{non-ref} \end{bmatrix} \\ \text{NON-HD-DTR} & \begin{bmatrix} \text{HEAD} & \textit{verb} \mid \text{MOD}\ [1] \\ \text{CONT} & [4]\textit{proposition} \end{bmatrix} \end{bmatrix}$$

It simply says that it is a nominal phrase whose head daughter is expletive and whose non-head daughter is a clause with a proposition. Given this specification, the structure of the subtype clausal complement phrase can be simplified as in (21):

(21) Clausal complement phrase (revised)

cl-comp-ph =>
$$\begin{bmatrix} \text{NON-HD-DTR} & \begin{bmatrix} \text{HEAD} & \textit{verb} \\ \text{CONT} & [4]\textit{proposition} \end{bmatrix} \end{bmatrix}$$

All this structure does is identify the propositional content of the whole nominal phrase with that of the non-head daughter clause. This is sufficient since the rest is specified on its supertype in (22).

3.5. IHRC-phrase Structure

Let us finally turn our attention to the IHRC-phrase (or clausal relative phrase). I assume that the IHRC (i.e., without the head-no) has exactly the same structure as the clause in the clausal complement phrase, of type *adnom-clause*. The following is the feature structure of the IHRC-phrase I propose:

(22) IHRC-phrase (preliminary)

ihrc-ph =>
$$\begin{bmatrix} \text{HEAD} & \textit{noun} \\ \text{CONT} & \begin{bmatrix} \text{INDEX} & [2] \\ \text{REST} & [3] \cup \{[4]\} \end{bmatrix} \\ \text{HD-DTR} & [1]\ \textit{non-ref} \\ \text{NON-HD-DTR} & \begin{bmatrix} \text{CONT} & [4]\textit{proposition} \\ \text{HEAD} & \text{verb} \mid \text{MOD}\ [1] \\ \text{ARG-S} & [5] \circ \begin{bmatrix} \text{INDEX} & [2] \\ \text{REST} & [3] \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

That is, IHRC-phrase is a nominal phrase whose head daughter is an expletive. Its non-head daughter is a clause with a propositional content. The non-head daughter clause modifies an argument, which happens to be an argument of the head of the non-head daughter clause.

Now compare the structure for the IHRC-phrase with that for the EHRC-phrase proposed in (18) above. Their similarities are strong enough to suggest the availability of a shared supertype, modificational phrase. The supertype would have the following structure:

(23) Modificational-phrase

mod-ph =>

$$\begin{bmatrix} \text{HEAD} & \textit{noun} \\ \text{CONT} & \begin{bmatrix} \text{INDEX} & [2] \\ \text{REST} & [3] \cup \{[4]\} \end{bmatrix} \\ \text{HD-DTR} & [1]\ \textit{noun} \\ \text{NON-HD-DTR} & \begin{bmatrix} \text{CONT} & [4]\textit{proposition} \\ \text{HEAD} & \textit{verb}\ |\ \text{MOD}\ [1] \\ \text{ARG-S} & [5] \circ \begin{bmatrix} \text{INDEX} & [2] \\ \text{REST} & [3] \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Given the specification of the supertype, the EHRC-phrase now has the following specification:

(24) Japanese EHRC-phrase (revised)

ehrc-ph =>

$$\begin{bmatrix} \text{NON-HD-DTR} & \begin{bmatrix} \text{HEAD} & \textit{verb}\ |\ \text{MOD}\ [1] \\ \text{ARG-S} & [5] \circ [1]\begin{bmatrix} \text{INDEX} & [2] \\ \text{REST} & [3] \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

What this feature structure of EHRC-phrase specifies is that the modified NP of the non-head daughter clause is identified with one of its arguments. Given the specification of the supertype in (23), the modified NP is also to be identified with the head NP of the whole relative phrase.[8]

Given the supertype feature (23), the structure of the IHRC-phrase in (22) can now be radically simplified as in (29):

(25) IHRC-phrase (revised)

ihrc-ph => [HD-DTR *non-ref*]

All this states is that the head daughter NP is a non-referential NP. The rest is specified at the level of its supertype (23).

Notice that all the specifications in (25) are already given in the structure for clausal nominal phrase in (20), i.e.,. at the level of another supertype of IHRC-phrase. This means that IHRC does not need a specification of its own. All we need is to say that IHRC-phrase is a subtype of both the clausal nominal phrase and of the modificational phrase. This is clearly an unusual situation. How should we interpret it? It may seem to imply that the present analysis is on a wrong track. This is not necessarily the case. I would like to claim instead that this peculiar lack of substance is at the heart of the unique distribution of the IHRC. I demonstrated in the previous section that the IHRC is contrastive with the EHRC in that the syntactic structure of does not guarantee the availability of the IHRC interpretation (=entity reading). The IHRC is unstable as a grammatical construction in the sense that it becomes available only when the interpretation is forced out. The present analysis accommodates this unstability of the IHRC.

To sum up, I have proposed that the IHRC-phrase is a subtype of a relative-phrase and of a clausal complement phrase at the same time; namely, it inherits features from both the feature structures of the relative-phrase and those of the clausal complement. Importantly, it lacks independent specifications of its own, but all the information is supplied by the combination of its supertypes. Thus the multiple inheritance of the IHRC-phrase proposed here is peculiar in several respects. First of all, it is connected to more than one phrase type; the types of information it inherits from the two supertypes are not sorted into distinct classes such as "headedness" and "clausality." This is clearly not a usual type of multiple inheritance. Secondly, the IHRC-phrase does not have its own feature specifications, but everything is supplied by the supertypes. I would like to suggest that this peculiarity itself could explain the coercive nature and the restricted availability of the interpretation of IHRC. The lack of substance as an independent structure type could explain its unstable status as an independent grammatical construction.

4. Additional motivations for the details of the analysis of IHRC

The remainder of this paper presents additional data supporting the details of the analysis of the IHRC given above. That is to say, the current analysis (1) does not make use of the NONLOCAL feature such as REL or SLASH, and (2) refers to the ARG-S feature in discussing the Japanese relative clauses. Such practices ought to find appropriate motivations based on data. This section gives some data for the motivations.

4.1. Locality of IHRC

Note that this rule does not use a NONLOCAL feature: SLASH or REL. One obvious prediction of this analysis is that this rule is local, and hence that the Japanese IHRC is local. This prediction is apparently borne out, though there seem to be complications when complex predicates (verbs with -tai, *-hosii* etc.), and verbs of reporting are involved. The following examples seem to suggest that the Japanese IHRC (generally) abides by the requirement of locality, while Japanese EHRC is often non-local:

(26) a. Hirosi -wa hurui omotyabako -kara [[mukasi ani -ni kasite-kure -to
top old toybox from before brother dat lend COMP
yoku tanonde-ita] omotyo] -o hiroi-ageta.
often ask toy acc pick-up-past

b. * Hirosi -wa hurui omotyabako -kara [[mukasi ani -ni omotyo -o kasite-kure -to
top old toy box from before brother dat toy acc lend COMP
yoku tanonde-ita] no] -o hiroi-ageta.
often ask NO acc pick-up-past
'From his old toy box Hirosi picked up the toy that he used to ask his brother to lend him.'

The marginality of (26b) indicates that the long-distance dependency is not as free in the IHRC as in the EHRC. This is consistent with the present analysis in which the IHRC does not use a NONLOCAL feature, whereas the EHRC does.

4.2. Involvement of ARG-S features

The structures I proposed in this paper use ARG-S (argument strucrure) features rather than Valency features to explain IHRCs. ARG-S and Valency features are different in that the former do not control the syntactic realization of arguments, so that it is not "cancelled" as each argument is combined with a predicate. The indenpendence of the ARG-S feature from Valency features has demonstrated its explanatory potential in recent years. Still, it is important that the use of the ARG-S feature in my proposal is not an arbitrary choice but is supported by some data.

One peculiarity of the Japanese (and Korean) IHRCs is the syntactic realization of the target. It has been a standard practice to capture the referential meaning of the IHRC by coindexing the target NP in the embedded clause with a non-overt argument in the matrix clause. However, a simple type of coindexing fails to accommodate some cases in Japanese. Nomura (1996) observes that in certain cases of IHRC, the target can remain implicit:

(27) [[Nikai -no yokusoo -ga ahure-ta] -no] -ga, sitamade morete-ki-ta.
upstairs gen bathtub nom overflow-past NO nom downstairs leak-come-past
'The bathtub upstairs overflowed, and the water leaked down to the downstairs.'

The target of modification, i.e., the subject of the matrix predicate more 'leak,' is understood to be *mizu* or *yu* 'water.' However, the IHRC does not contain the exact target argument. Based on this observation, Nomura (1996) rejects the syntactic approach to IHRCs and proposes a more cognitive one; i.e., the entity reading and the event reading are in a metonymic relation. The IHRC designates the whole scene, and at the same time, refers to a part of the scene that represents the whole scene. 'Water' in (27) is such a metonymic "part" of the whole.

The problem with this approach is that it is not restrictive enough. It is not clear what guarantees the availability of the implicit argument 'water' in this case. Obviously, not everything implicit can be the referent of the IHRC.

What backs up the reference of the implicit argument in this case is a set of lexical information such that the semantic object the verb *ahure* is some form of liquid, and so is that of the verb more 'leak,' with additional information that *yokusoo* 'bathtub' is a container of 'water.' (other forms of object can also be a candidate of each; but the intersection of the three points only to the liquidity.) So to solve this problem, we need to explore the types of syntactically implicit argument.

The examples in (28) are additional data of a similar kind given in Nomura (1996):

(28) a. [[Kesa kao -o sotta] -no] -ga, yuugata -niha mata nobite-kita.
this morning face acc shave-past NO nom evening in-top again grow-start-past
'I shaved my face this morning, and it already started to grow in the evening.'
b. [[Tuti -o 2 meetoruhodo hotta] -no] -o, ue -kara nozokikonda.
soil acc 2 meters-about dig-past NO acc above from look-into-past
'I dug the ground about 2 meters deep, and I looked into it from above.'

The referents of the IHRC in these cases are presumably *hige* 'beard' and *ana* 'hole,' respectively, and yet they do not appear in the embedded clauses. This cannot be considered as a just type of ellipsis typical of the languages like Japanese, where virtually anything recoverable can be left unmentioned; i.e., there is no way the referents in question can be made to appear in the embedded clauses:

(29) a. Yokuso -ga yu *-o/*-ni/?-de ahureta
bathtub nom hot water acc/dat/with overflow-past
'The bathtub overflowed with water.'
b. Kesa kao -o hige *-o/*-ni/*-de sotta
this morning face acc beard acc/dat/with shave-past
'I shaved my face of beard this morning.'
c. Tuti -o 2 meetoruhodo ana *-o/*-ni hotta
soil acc 2 meters-about hole acc/dat dig-pst
'I dug the ground a hole about 2 meters deep.'

What is interesting, though, is that the referents in question could alternate with the explicit arguments in (27) and (28a-b):

(30) a. Yu -ga ahureta 'Water overflowed.'
b. Hige -o sotta 'I shaved beard'
c. Ana -o hotta 'I dug a hole.'

The possibility of alternation, then, clearly provides a suggestive key to this problem.[9] How should we encode the argument that can alternatively appear in syntax? We could list the true syntactic arguments and the alternative argument together, somewhere, which is independent of the syntactic realization of argument. The ARG-S, which is a list of syntactic arguments independent of their syntactic realization, is a ready candidate to include such alternative arguments. This issue certainly needs to be investigated with a larger set of data, but as far as the data given here are concerned, the structure of the IHRC in Japanese seems much better accommodated by making reference to the ARG-S features than to the Valence features.

5. Conclusion

This paper has proposed a type-hierarchical analysis of the Japanese IHRC in the framework of HPSG. One of the main claims made in this paper is that it is misdirected to define the IHRC either as a relative clause or as a complement clause; the IHRC is a subtype of both of the structures, as its syntactic and semantic properties naturally suggest. The multiple inheritance assumed for the IHRC is admittedly of unusual character. The most striking part of the structure of the IHRC is that it does not have a specification of its own; everything follows from the specifications of its supertypes. I suggest that this peculiarity and the lack of substance explain the restricted availability of the interpretation of IHRC and the lack of stability of IHRC as a grammatical construction.

Notes:

1. Calling attention to the close relationship between the IHRC and the clausal comlement, Park (1994) and Y-B. Kim (1996) presents an interesting claim that the interpretation as IHRC (or the choice of this interpretation) is governed by pragmatics. Unfortunately, however, Park (1994) leaves the availability of IHRC reading solely to some unformalized pragmatics, and it is not clear at all what is happening in feature structures when a clausal complement, which is to refer to an event, comes to refer to an entity. In Y-B. Kim (1996) the ambivalence of an entity reading and an event reading is explained in terms of the choice of the argument which supplies the index of the nominal head *kes* (corresponding to no in Japanese). Y-B. Kim's (1996) insight is interesting, but his analysis contains several technical problems. First of all, it says that the index of the nominal head can be token identical with a tag on a SOA-ARG,

implying that a SOA-ARG has an index. This obviously goes against the general assumption that an index is a feature for a nominal entity. Secondly, since he analyzes the ambivalence only in terms of the token identity of indices, it is not clear how the information concerning the semantic restriction (RESTR) of the target noun is supplied. Finally and most crucially, when the SOA-ARG is selected for token-identity, the index of the CONTENT feature and the tag in the restriction set within the CONTENT feature are to become token-identical. This is clearly deviant from the generally accepted architecture of the feature structures.

2. Gapless relative is a type of relative clause in Japanese in which the head noun does not correspond to any gap in the relative clause. The following is an example:
   (i) Gomu -ga moeru nioi
   rubber nom burn smell
   'the smell of rubber burning'
   The analysis of gapless relatives is beyond the scope of this paper. For reference, a type-hierarchical analysis is proposed by Cha (1997).
3. Following Sag (1996), the symbol ○ designates the "sequence union" or "shuffle" operation. The difference between the CELR and the AELR is that the latter locates the extraction in the ARG-S feature instead of in the COMPS (or Valence) feature. A motivation for this revision will be given later. For typographical reasons, numbers in square brackets (e.g., [1]) are used in the place of the conventional boxed numbers for indexing throughout this paper.
4. I use VALence feature instead of SUBJ/COMP feature for simplicity's sake. More discussion is necessary to determine whether the Subject/complement asymmetry is significant in Japanese relative clauses.
5. MOD feature is supposed to be an indicator of a special morphology of modifiers. In reality, verb morphology has been greatly impoverished in Japanese, and Modern Japanese does not have any of such special morphology of verbs. MOD, in other words, is a zero-morphology in Japanese. We still retain the feature so as to make the analysis applicable to languages like Korean.
6. Note that this clause type is not reserved for the complement clause. It is suitable for the gapless relative clause as well, whose head verb also has a non-empty MOD feature with no change in its ARG-S value.
7. This paper does not really discuss the interaction of the clause type. The proposed structures of phrases involve redundancies which ought to be eliminated by taking into account the interaction of the clause type.
8. Recall that the identity of [the MOD value] and [one argument in the non-head daughter] is established at the level of AELR. And consequently this is reserved for the EHRC structure. Only verbs which have undergone AELR are compatible with this feature structure. Related to this restriction is that the verb heading.
9. There are other data that indicate that the alternation alone is not enough to correctly capture the problem involved in the reference of implicit arguments.

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