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Head-Internal Relative Clauses and the Mapping Hypothesis

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Abstract

In this paper, we claim that existential implication based on existential closure (Heim (1982)) plays a crucial role in the syntax and semantics of constructions involving head-internal relative clauses (HIRC). By adopting Diesing's (1992) Mapping Hypothesis, we assert that the VP level is crucial: the internal head must be interpreted inside VP at LF. By this hypothesis, we can explain some interesting properties inside the HIRC, which have not been noticed in the previous literature. Although we concentrate on Japanese examples, this hypothesis may be applicable to other languages which include the HIRC construction, as briefly mentioned in section 3. 2.

In Part II of the present paper, we will discuss some specific problems of negation in HIRC constructions, and explore its relevance both in syntactic and semantic terms.

Part I: Head-Internal Relative Clauses and the Mapping Hypothesis
Yuki Hayashi

1. Introduction

The purpose of the present article is to present an analysis of so-called Head-Internal Relative Clauses (HIRC; also called Internally-Headed Relative Clauses). The primary data are from Japanese, though we will discuss the relevant phenomena in a few other languages including Lakhota.

Sentences in (1) exemplify HIRC sentences, and (2) is a schematic representation of the configuration of an HIRC sentence in Japanese.

(1) a. Taroo-ga   [[ringo-ga   sara-no ue-ni aru]-no]-o totta
        Taroo-NOM   apple-NOM plate_on   be-*no*-ACC picked_up
        'Taroo picked up the apple which was on the plate.'

    b. [[Taroo-ga <u>ronbun</u>-o kaita]-no]-ga zyaanaru-ni notta
       Taroo-NOM thesis-ACC wrote-*no*-NOM journal-on   appeared
       'The paper that Taroo wrote appeared in a journal.'

(2) ... [[... head ... V_1]-no]-CASE ... V_2

The head NP ("internal head") is an argument of the embedded verb V_1, which assigns a case and θ-role to it. The HIRC itself is considered to be an argument of the matrix verb V_2. The matrix verb assigns a case and θ-role to the HIRC. *No* is a morpheme internal to the HIRC, but its property is controversial and we will not attempt to give a precise characterization of this element in the present discussion.

    The distinctive properties of HIRC constructions have been discussed by quite a few researchers such as Ito (1986), Tsubomoto (1991), Watanabe (1992), Mihara (1994), Murasugi (1994), Hoshi (1995), Kuroda (1999) and Hasegawa (2002), among others, in comparison with corresponding Head-External Relative Clause (HERC) sentences.

    In this paper, we mainly focus on this point, and assert that existential implication based on existential closure (Heim (1982)) plays a crucial role in this construction. By adopting Diesing's (1992) Mapping Hypothesis, we assert that the VP level is crucial: the internal head must be inside VP at LF. By this hypothesis, we can explain some interesting properties inside the HIRC, which have not been noticed in the previous literature. Although we concentrate on Japanese examples, this hypothesis may be applicable to other languages which include the HIRC construction, as briefly mentioned in section 3. 2.

2.   Existential Implication

This section presents the main hypothesis of this paper.[1] The main point of the hypothesis is that the HIRC is licensed by existential implication, which is in turn based on existential closure in the sense of Diesing (1992) (see also Heim (1982)). This hypothesis is largely based on two works; Shimoyama (1999) and Diesing (1992). In section 2. 2 we look at Evans (1980), in section 2. 3 we look at Shimoyama (1999) and in section 2. 4 we review Diesing (1992).

2. 1   The Hypothesis

As we see below, Shimoyama (1999) proposes that the essence of the HIRC is that it is interpreted as if it contains an E-type pronoun referring to an entity or set induced by the HIRC. According to her analysis, the correct interpretation of (3a) is not (3b) but (3c).

(3) a. [[eki-de   yopparai-ga taore-ta]-no]-ga   keekan-ni   tasuke-rare-ta
       station-at drunk-NOM   fell_down-*no*-NOM policeman-by was_helped

    b. 'The drunk who fell down at the station was helped up by the policeman.'

    c. 'A drunk fell down at the station and he was helped up by the policeman.'

    Essentially accepting this observation of Shimoyama's, we hypothesize that for an HIRC sentence to be licensed (grammatical), the internal head must have a reference given by "existential implication". Existential implication is assumed to be based on "existential closure" by Heim (1982). Heim claims that indefinites are not inherently quantified, but merely introduce

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[1] Our main hypothesis is largely due to T. Nishigauchi (class lectures and p.c., 2002).

variables into the logical representation. These variables are bound by an implicit existential quantifier, and this effect is called existential closure. Diesing (1992) hypothesizes that existential closure binds elements inside "nuclear scope", one of the tripartite structure at LF in her hypothesis. The nuclear scope corresponds to a "proposition" in terms of classical predicate logic, and the LF representation of *Every porcupine sang* is assumed to be (4).

(4) $\forall x$ [porcupine(x)]   x sang
         quantifier   restrictive clause   nuclear scope

She asserts that elements inside VP are mapped into the nuclear scope (we review her proposals in section 2. 4 below). Since we assume that existential implication, which gives a reference to an entity or set involving the internal head, is closely related with existential closure, it follows that the internal head must be inside VP.

Existential implication is incompatible with a negative indefinite NP. As shown in (5), negative indefinite NPs cannot be the internal head of the HIRC.[2]

(5)   a.*[[Taroo-ga <u>nanimo</u> kawanakatta]-no]-ga betu-no mise-demo utteita
         Taroo-NOM nothing did_not_buy-*no*-NOM another shop-also was_sold
         'Taroo did not buy anything and they were also sold in another shop.'

    b.*[[<u>daremo</u> yattekonakatta]-no]-ga miti-ni mayotteita
         nobody did_not_come-*no*-NOM was_losing_his_way
         'Nobody came and they were losing their way.'

Part II of the present article will discuss negation in HIRC constructions.

E-type pronouns cannot take an antecedent with the negative expression *no* either, as we see in section 2. 2.

On the other hand, the referent of the E-type pronoun is not necessarily "referential" in the intuitive sense. Consider the following example.

(6) [[Taroo-ga [[<u>ringo-ga</u> tana-no ue-ni aru]-to]-itta]-no]-ga oisisoo-da
      Taroo-NOM apple-NOM shelf_on   be-COMP-said-*no*-NOM looks_delicious
      'Taroo said that an apple was on the shelf and it looks delicious.'

This sentence is compatible with the situation in which Taroo said "An apple is on the shelf", and the fruit which is on the shelf looks delicious, but it is not an apple but a pear. That is, there is no apple on the shelf, and Taroo mistook the pear on the shelf for an apple. Thus, (7) is an acceptable sentence whereas (8) is semantically incoherent (shown by #), for the embedded verb *sitteiru* 'know' in (8) requires its complement clause to be true (a "factive" verb) whereas *sinziteiru* 'believe' in (7) does not (a "non-factive" verb).[3]

(7) [[Taroo-ga [[<u>ringo-ga</u> tana-no ue-ni aru]-to]-sinziteiru]-no]-ga zitu-wa nasi-datta
      Taroo-NOM apple-NOM shelf_on   be-COMP-believe-*no*-NOM   actually pear-was
      'Taroo believes that an apple is on the shelf but actually it was a pear.'

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[2]Williamson (1987) observes that the HIRC in Lakhota abides the same restriction.

[3]One might find that the sentences (7) and (8) sound unnatural because of the fact that the matrix-subject (the HIRC clause) is marked by the nominative *ga*, not by the topical *wa*. In this case, we can improve the acceptability by putting *koto* 'fact' into the end of the sentences to make them noun phrases.

(8) #[[Taroo-ga [[ringo-ga   tana-no ue-ni aru]-to]-sitteiru]-no]-ga zitu-wa nasi-datta
      Taroo-NOM   apple-NOM shelf_on   be-COMP-know-*no*-NOM actually pear-was
      'Taroo knows that an apple is on the shelf but actually it was a pear.'

Thus what is implied here is not the existence of an apple, but the existence of something that Taroo means to refer to by the expression "an apple is on the shelf".

Now we want to emphasize again that existential implication is based on existential closure, thus the VP-level is also crucial to our hypothesis. For an indefinite NP to be given an existential force by existential closure, it must be mapped into the nuclear scope (Diesing's (1992) Mapping Hypothesis: see section 2.4). Syntactically, this NP must be in VP in keeping with the Mapping Hypothesis. Thus for an HIRC sentence to be grammatical, the internal head must be inside VP. We sometimes refer to the VP domain as the domain of existential implication, and use the term "license" to mean that the internal head of the HIRC is inside VP and satisfies the condition to have a reference given by existential implication.

2.2   Evans (1980)

Evans (1980) observes the contrast with respect to the functions of pronouns in the following examples, his (6) and (7).

(9) Few congressmen admire only the people they know.

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

In (9) the pronoun *they* is bound by the quantifier phrase *few congressmen* and is characterized as a bound variable. On the other hand, the pronoun in (10) cannot be bound. Syntactically, it does not satisfy the c-command relation necessary for a bound reading. Semantically, if it were bound, it would have a reading that few congressmen both admire Kennedy and are very junior, but this is not the reading of (10). Rather, (10) entails that few congressmen admire Kennedy, and that all the congressmen who admire Kennedy are very junior. This latter type of pronoun has been referred to as "E-type" pronouns in the literature.

A useful test of whether or not a pronoun is bound by an antecedent quantifier is to replace the antecedent with the quantifier expression *no*, and see whether the result is acceptable. Now we find the following contrast, Evans's (1980) (12) and (13). (11) is the sentence with a bound variable, and it allows the antecedent with *no*. On the other hand, (12) is the sentence with an E-type pronoun and does not allow the antecedent with *no*.

(11) No congressmen admire only the people they know.

(12) *No congressmen admire Kennedy, and they are very junior.

Evans asserts that the role of the E-type pronoun is that of referring to the object(s), if any, which verify the antecedent quantifier-containing clause (that is, the object(s) which satisfy the predicate in the antecedent clause and thereby make that clause true). That is, the role of *they* in (10) is that of the expression *the congressmen that admire Kennedy*. If this is correct, we explain why the truth of the clause containing them requires that all the relevant objects satisfy the predicate, and why these pronouns cannot have a *no* quantifier as antecedent.

2.3 Shimoyama (1999)

So far we have translated HIRC examples in the glosses as if they had the same meanings as their HERC counterparts. However, this is not true: rather, HIRC sentences are interpreted as if they consist of independent sentences, first of which contains a weak determiner and the latter of which contains an E-type pronoun. Thus, the following example should be given an English translation as indicated there. [4]

(13) [[eki-de   yopparai-ga taore-ta]-no]-ga   keekan-ni   tasuke-rare-ta
      station-at drunk-NOM   fell_down-*no*-NOM policeman-by was_helped
      'A drunk fell down at the station and he was helped up by the policeman.'

We follow Shimoyama (1999) in the way we translate the relevant examples into English, accepting the idea that the essence of the interpretation of HIRC involves that of E-type pronouns.

Shimoyama first introduces a phenomenon called "(weak) exhaustivity", which is observed in certain constructions with embedded interrogatives, as in (14), her (17).

(14) Taroo-wa [dare-ga neko-o turetekita-ka]   sitteiru
      Taroo-TOP who-NOM cat-ACC brought_along-Q know
      'Taroo knows who brought along a cat.'

This sentence implies that, of every person who brought along a cat, Taroo knows that he/she brought along a cat. If there is a person who brought along a cat but Taroo does not know that fact, we would not want to say (14) is true. This property is called (weak) exhaustivity, and licenses the inferences on the following form:[5]

(15)   Taroo knows who brought along a cat.
         x brought along a cat.
       ⇒Taroo knows that x brought along a cat.

Next Shimoyama considers an HERC example below, her (16a).

(16) Taroo-wa [[dare-ga   turetekita]   neko-ga nigedasita-ka] sitteiru
      Taroo-TOP who-NOM brought_along cat-NOM ran_away-Q   know
      Lit. 'Taroo knows a cat that who brought along ran away.'

For (16) to be true, Taroo has to know, in accordance with exhaustivity, of every person x such that a cat that x brought along ran away, that a cat that x brought ran away. That is, Taroo has to know all the true propositions of the following form:

(17) that a cat that x brought along ran away

Then Shimoyama turns to an HIRC sentence (18), her (16b).

(18) Taroo-wa [[[dare-ga neko-o turetekita]-no]-ga   nigedasita-ka] sitteiru
      Taroo-TOP who-NOM cat-ACC brought_along-*no*-NOM ran_away-Q   know
      Lit. 'Taroo knows who$_x$ brought along a cat and that the cat that x brought along ran away.'

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[4]From now on, we interpret examples like the ones here. That is, we will not use the same interpretation as their HERC counterparts. When we repeat the examples that are given above, we change the gloss without provisos.

[5]We use the term "exhaustivity" in the sense of "weak exhaustivity" in this paper, following Shimoyama (1999).

She points out that if there is a cat that was brought along but did not run away in the relevant domain of discourse, (18) does not sound perfectly felicitous. For (18) to be true, every cat that was brought along must have run away and Taroo has to know two sets of true proposition of the form:

(19) [that x brought along a cat] and [that the cat that x brought along ran away]

This interpretation is equivalent to that of the E-type pronouns.

Examples with quantifiers also show that the E-type reading is necessary. Consider the following example, which is Shimoyama's (12).

(20) John-wa [[Mary-ga san-ko-no   ringo-o   muitekureta]-no]-o tabeta
John-TOP   Mary-NOM three-CLS-GEN apple-ACC peeled-*no*-ACC   ate
'Mary peeled three apples and John ate them all.'

As Hoshi (1995) notes, the scope of the internal head *san-ko-no ringo* 'three apples' in (20) does not extend to the matrix clause. If it did, the sentence would mean that three apples are such that Mary peeled them and John ate them, and would be compatible with a scenario where Mary peeled five apples and John ate three of them. This, however, is not the correct meaning of this HIRC sentence, though it is the meaning of the corresponding HERC sentence (21).

(21) John-wa [Mary-ga muitekureta] san-ko-no   ringo-o   tabeta
John-TOP Mary-NOM peeled   three-CLS-GEN apple-ACC ate
'John ate three apples that Mary peeled.'

Rather, (20) means that Mary peeled only three apples and John ate them all, which is an E-type reading.

The effect of "exhaustivity" can be cancelled if there is another quantifier in the matrix clause.

(22) John-wa [[Mary-ga san-ko-no   ringo-o   muitekureta]-no]-o ni-ko   tabeta
John-TOP   Mary-NOM three-CLS-GEN apple-ACC peeled-*no*-ACC   two-CLS ate
'Mary peeled three apples and John ate two of them .'

In this sentence, John ate two of the three apples prepared by Mary. Thus full exhaustivity is a default, which can be cancelled by the presence of an overt quantifier in the matrix clause.

Shimoyama adopts Heim and Kratzer's analysis of E-type anaphora (Heim and Kratzer (1998, ch. 11)) and assumes that the function of the morpheme *no* contained in the HIRC in Japanese is similar to that of the definite article *the* in English, as shown in (23) and (24).

(23) The function of *the* (Heim and Kratzer (1998, p. 74))
For any $f \in D_{\langle e,t \rangle}$ such that there is exactly one x for which f(x)= 1,
⟦**the**⟧(f) = the unique x for which f(x)= 1.

(24) The function of *no* (Shimoyama (1999, p. 167))
⟦**no**⟧$\in D_{\langle\langle e,t\rangle,e\rangle}$
⟦**no**⟧(f) denotes the maximal individual *a* such that f(*a*)= 1.

2.4 Diesing (1992)

Now let us turn to Diesing (1992), which is also very important to our hypothesis.

Diesing assumes that the logical representation has a tripartite structure, consisting of a quantifier (an operator), a restrictive clause and a nuclear scope. In terms of classical logic, a restrictive clause corresponds to a "restriction", and a nuclear scope corresponds to a "proposition" or an "open sentence". For example, the logical representation of *Every porcupine sang* is (4).

(4) $\forall x$ [porcupine(x)]   x sang
      quantifier   restrictive clause   nuclear scope

Another important premise is that there are two different types of predicates; individual-level predicates and stage-level predicates. Individual-level predicates roughly correspond to more or less inherent states such as "unsuitable for eating", "intelligent" and "having six legs". Stage-level predicates typically correspond to temporary and extrinsic states such as "destroying my viola da gamba", "falling down the stairs" and "being sick".

This difference affects the interpretation of its subject NP. When the subject is a bare plural (plural NP without quantifiers or determiners), the subject of individual-level predicates has a generic reading and that of stage-level predicate is ambiguous between a generic reading and existential reading. This existential reading is assumed to be assigned by "existential closure" (Heim (1982)), which binds all the remaining variable introduced in the nuclear scope. For example, in (25b), the variable y introduced by *a banana* is not bound by any overt quantifier, thus it is bound by existential closure ($\exists y$).

(25)   a. Every llama ate a banana.

   b. $\forall x$ [x is a llama]   ($\exists y$) y is a banana $\wedge$ x ate y
      quantifier   restrictive clause   nuclear scope

The subject of individual-level predicates appears in the restrictive clause and gets the generic reading.

Now Diesing proposes an important hypothesis, the "Mapping Hypothesis".

(26) Mapping Hypothesis
      Material from VP is mapped into the nuclear scope at LF.
      Material from IP is mapped into a restrictive clause at LF.

It is then expected that when the mapping takes place, the subject of stage-level predicates can be in the VP-internal position, since it can have an existential reading, which is assigned to an element in the nuclear scope by existential closure. On the other hand, the subject of individual-level predicates must be in the IP position, since it never has an existential reading.

3.   The Internal Head

3.1   Weak NPs vs. Strong NPs

Milsark (1974) distinguishes two types of determiners, which he calls "strong" and "weak", and gives a syntactic diagnostic for distinguishing between them. Weak determiners can appear

with a subject NP (or an associate) in *there* construction, whereas strong determiners cannot (the so-called definiteness effect).[6] This is shown in (27).

(27) a. There {is/are} {a/some/a few/many/three} fly (flies) in my soup.

    b.*There {is/are} {the/every/all/most} fly (flies) in my soup.

The determiners in (27a), that is, *a, some, a few* and *many* are all weak determiners. The numerals such as *three* are also included in this class. On the other hand, the determiners in (27b), that is, *the, every, all* and *most* are strong determiners.

Milsark also describes what he calls a semantic distinction between the two types of determiners, by using the notion of presupposition. Strong determiners presuppose the existence of the entities they are applied to. Weak determiners are ambiguous between a presuppositional reading and a nonpresuppositional ("cardinal" in the sense of Diesing (1992)) reading in which they merely assert the existence of whatever entities they are applied to.

We refer to NPs with weak determiners "weak NPs", and those with strong determiners "strong NPs". We include proper nouns in strong NPs, for they are not allowed in the *there* construction and presuppose the existence of the entities they are applied to, and bare nouns in weak NPs, for they have the exactly opposite properties.

However, in Japanese, we cannot directly use this diagnostic since Japanese does not have *there* construction (or one that corresponds to it). T. Gunji points out that we can define weak NPs in Japanese in semantic term. If we define reflexive and irreflexive determiners in the following way (see Heim and Kratzer (1998, ch. 6)), we can define weak NPs as NPs with determiners which are neither reflexive nor irreflexive.[7]

(28) δ is reflexive iff for all A : $\langle A, A \rangle \in R_\delta$
     δ is irreflexive iff for all A : $\langle A, A \rangle \notin R_\delta$

Now let us look at examples. Hayashi (2003, ch. 3) discusses that the subject position of the matrix clause is a hallmark of a genuine HIRC, in opposition to apparently similar adverbial constructions, and when an HIRC appears in this position, only weak NPs can be the internal head ot that HIRC.

(29) a. [{ suunin-no / takusan-no / syoosuu-no } gakusei-ga   paatii-ni araware-ta
            several   many   a few   student-NOM party-to appeared
      no]-ga ato-de byooki-ni nat-ta
      NO-NOM later   sick   became
      '{ Several / many / a few } students showed up at the party, and they got sick later.'

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[6] Although the term "definiteness effect" is often used, it is not exactly the definite/indefinite distinction that divides strong and weak determiners. *Most* in (27b) is not allowed in the *there* construction and thus is a strong determiner, yet probably it is indefinite.

[7] In (28), δ stands for a determiner and A ranges over subsets of the domain D which is the set of all individuals that exist in the real world. R stands for "relation", and we take "relation" here in its exact mathematical sense, that is, as a set of ordered pairs. For example, assume that δ=*all* and A=*students*. Since *All students are students* is always true, $\langle A, A \rangle \in R_\delta$ is true in this case. Since for all A, $\langle A, A \rangle \in R_{all}$ is true, *all* is reflexive.

b. *[{ subete-no / hotondo-no } gakusei-ga   paatii-ni araware-ta no]-ga
           all   most   student-NOM party-to appeared   NO-NOM

ato-de byooki-ni nat-ta
later   sick   became

'{ All / most } students showed up at the party, and they got sick later.'

Each of the internal heads in (29a) are weak NPs and the sentence is acceptable, whereas those in (29b) are strong NPs and the sentence is unacceptable.

How can we explain this contrast? As we saw above, Milsark (1974) observes that strong determiners presuppose the existence of the set of entities they are applied to, whereas weak determiners are ambiguous between a presuppositional reading and a nonpresuppositional reading. In order to explain this fact, Diesing hypothesizes that strong and weak determiners differ with respect to how they are treated at the level of LF (Diesing (1992, ch. 3)). She suggests that they differ with respect to QR. Strong NPs behave like quantified NPs and raise by QR to adjoin to IP. When the tree is mapped into the tripartite structure ("tree splitting"), the QRed strong NPs are mapped into the restrictive clause and thus get presuppositional readings.

On the other hand, weak NPs are ambiguous with respect to QR. If they are QRed, they are mapped into the restrictive clause and will get presuppositional readings, just the same as strong NPs. If they are not QRed, they are mapped into the nuclear scope and are given existential readings by existential closure.

If we adopt this approach, the contrast above follows immediately. As we assume that the HIRC is licensed by existential implication, the grammaticality of (29a) is expected, since the internal head is inside the VP, that is, inside the domain of existential closure. The ungrammaticality of (29b) is also expected, since the HIRCs are beyond the domain of existential implication. Crucially, the internal head is outside the VP.

The HERC counterparts (in the descriptive sense) of (29a) and (29b) do not show this contrast.

(30) a. [paatii-ni araware-ta { suunin-no / takusan-no / syoosuu-no } gakusei]-ga
            party-to   appeared   several   many   a few   student-NOM

ato-de byooki-ni nat-ta
later   sick   became

'{ Several / many / a few } students who showed up at the party got sick later.'

b. [paatii-ni araware-ta { subete-no / hotondo-no } gakusei]-ga
     party-to   appeared   all   most   student-NOM

ato-de byooki-ni nat-ta
later   sick   became

'{ All / most } students who showed up at the party got sick later.'

Both (30a) and (30b) are grammatical. These are additional evidence that HIRC sentences and HERC sentences have different properties.

Even when the HIRC and HERC sentences coincide in grammaticality, the meanings are different. For example, for (29a) with *takusan-no gakusei* 'many students' as the internal head to be true, many students in the context must show up at the party and all of them must become sick later. On the other hand, for (30a) with the same internal head to be true, it need not be so.

It is enough that many students are such that they came to the party and get sick later: there may be some others who came but did not get sick later.

3.2 Evidence from Other Languages

The so-called "definiteness effect" of the internal head of the HIRC is also observed in several languages in which the existence of the HIRC construction is reported. According to Basilico (1996), Gorbet (1976) shows that in Diegueño, the internal head cannot bear the definite marker *pu*, and Munro (1976) states that in Mojave, the definite suffix *-nʸ* never appears on the internal head.[8] Tellier (1989) also observes that the internal head of the HIRC in Mooré (a Gur language spoken in Burkina Faso) may not be definite.

Williamson (1987) observes just the same contrast between weak NPs and strong NPs in the HIRC in Lakhota (one of the Dakotan dialects spoken by the Sioux Native Americans in North America). According to Williamson, Lakhota has agreement markers for all NP arguments of the verb. There are two sets of agreement markers, one that indicates agreement with subjects and another that indicates agreement with what can loosely be called "objects", as shown in (31), his (8).

(31) a. wįyą   eya   cheya pi
        women some cry   PL
        'Some women cried.'

    b. Ed wįyą   eya wą +wicha +yąke
        Ed women some   3OBJ   see
        'Ed saw some women.'

Every relative clause in Lakhota is head-internal. Williamson states that "quantified expressions", our strong NPs, are excluded from the position of the internal head: NPs with the definite determiners *ki* 'the' and *k'u* 'the aforementioned', proper names and definite pronouns (whether null or emphatic), and NPs with various universal quantifiers, including *iyuha* 'all, every', *iyohila* 'each', and *ota ȟca* 'most'. Some examples are given in (32), her (13).

(32) a.*[[Edwin kuže] ki/cha] he   lel   thi
        Edwin sick   the/IND DEM here live
        'Edwin who is sick lives here.'

    b.*[[(miye) makuže] ki/cha] wichawota ki   ekta mnį kte
        1EMP I_sick   the/IND feast   the to   I_go FUT
        'The/A I who am sick will go to the feast.'

    c.*[[mila k'u mų   he] ki/cha] phe   šni
        knife the I_use DUR the/IND sharp NEG
        'The aforementioned knife that I was using isn't sharp.'

    d.*Ed [[šųkawakhą ota-ȟca othehika   pi] ki/cha] whichayuha
        Ed horses   most   expensive PL the/IND own_them
        'Ed has horses that are highly priced.'

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[8]Basilico (1996) incidentally explains this definiteness effect by adopoting Diesing's (1992) Mapping Hypothesis, although his assertion is very different from ours.

   e.*[[wichaša iyuha t'a pi] ki/cha] Lakhota pi
      men   all   die PL the/IND Lakhota PL
      'All men who died were Lakhota.'

On the other hand, "cardinality expressions" (our weak NPs) are allowed as the internal head: NPs with the realis indefinite determiners such as *wa* 'a' and *eya* 'some', those with the irrealis indefinite determiners (singular *waži* and plural *eta*), indefinite pronouns such as *tuwa* 'someone' and *taku* 'something', expressions with certain quantifiers such as *ota* 'many', *conala* 'few' and *tona* 'several' and cardinal numbers. Some examples are given in (33), her (14).

(33) a. [[wichaša ota   t'a pi] ki] hena Lakhota pi
          men   many die PL the those Lakhota PL
          'The many men who died were Lakhota.'

     b. [[Leo taku   eye] ki] he hecetu wala
          Leo something say the that be_that I_consider
          'I consider what Leo said to be that way.'

     c. Ed [[šųkawakhą conala othehika pi] cha] wichayuha
          Ed horses   few   expensive PL IND own_them
          'Ed has few horses that are highly priced.'

     d. [[wakhąyeža nųp iyotą wachi wophika pi] ki] atkuku ki slolwaye
          children   two best dance be_skillful PL the father the I_know
          'I know the father of the two children who know how to dance best.'

This contrast is exactly the same as the contrast in Japanese we observed above, and our explanation may be applicable to the case of Lakhota, although a verification is beyond the range of this paper.

4. The Predicate of the HIRC

4.1 Stage-Level Predicates vs. Individual-Level Predicates

In section 2.4 we saw that there are two types of predicate; stage-level predicates and individual-level predicates. Individual-level predicates roughly correspond to more or less inherent states such as "intelligent" and "cute" whereas stage-level predicates typically correspond to temporary and extrinsic states such as "falling down the stairs" and "being sick".

This difference affects the interpretation of its subject NP. When the subject is a bare plural NP, the subject of individual-level predicates has a generic reading and that of stage-level predicate is ambiguous between a generic reading and an existential reading.

Assuming that this existential reading is assigned by existential closure, Diesing (1992) asserts the distinction in (34).

(34) Stage-Individual-level distinction
      In a logical representation, bare plural subjects of stage-level predicates can appear in either the nuclear scope (to be bound by existential closure) or the restrictive clause (to be bound by either the abstract quantifier *Gen* or an overt operator). Bare plural subjects

of individual-level predicates can only appear in the restrictive clause. (Diesing (1992, p. 19))

Syntactically, it means that the subject of stage-level predicates can be in the VP-internal position whereas the subject of individual-level predicates must be in the IP position, according to her Mapping Hypothesis.

(26) Mapping Hypothesis
    Material from VP is mapped into the nuclear scope at LF.
    Material from IP is mapped into a restrictive clause at LF.

Since we hypothesize that the HIRC is licensed by existential implication based on existential closure, it is now expected that when the embedded predicate is stage-level, the HIRC is licensed whereas when it is individual-level, the HIRC is not licensed. This is in fact borne out. Let us see the examples.

(35) [[otokonoko-ga {heya-ni   mayoikonda/*kawaii}]-no]-ga raion-o mite kowagatta
       boy-NOM   room-into strayed   /cute-*no*-NOM   lion-ACC see was_frightened
    'A boy {strayed into the room/was cute} and he was frightened on seeing the lion.'

(36) [[tonbo-ga   {tondeiru/*tiisai}]-no]-ga yuuhi-o   abite kagayaita
       dragonfly-NOM flying   /small-*no*-NOM   setting_sun-ACC bask shone
    'A dragonfly {was flying/was small} and it shone basking in the setting sun.'

In (35), the embedded predicate *mayoikonda* 'strayed into' is stage-level and the sentence is grammatical whereas *kawaii* 'cute' is individual-level and the sentence becomes ungrammatical. By the same token, in (36), a stage-level predicate *tondeiru* 'flying' makes the sentence grammatical whereas an individual-level predicate *tiisai* 'small' makes it ungrammatical.

Corresponding HERC sentences do not show the contrast between stage-level and individual-level predicates.

(37) [{heya-ni   mayoikonda/kawaii}] otokonoko-ga raion-o mite kowagatta
       room-into strayed   /cute   boy-NOM   lion-ACC see was_frightened
    'The boy who {strayed into the room/was cute} was frightened on seeing the lion.'

As shown in (37), both types of predicates are allowed in HERC sentences.

4.2 Level Distinction in Contexts

Sometimes one predicate can be either stage-level or individual-level, depening on the context.

(38) [[tanpopo-ga   {saiteiru /*kiiroi}]-no]-ga kaze-ni hukarete yureteita
       dandelion-NOM blooming/yellow-*no*-NOM wind-by blown   trembling
    'A dandelion {was blooming/was yellow} and it was trembling blown by the wind.'

(39) [[momizi-ga kiiroi]-no]-ga kaze-ni hukarete yureteita
       maple-NOM yellow-*no*-NOM wind-by blown   trembling
    'A maple was yellow and it was trembling blown by the wind.'

In (38), if the predicate of the HIRC is *saiteiru* 'blooming', which is a stage-level predicate, the sentence is grammatical. On the other hand, if the predicate is *kiiroi* 'yellow', which is

individual-level, the sentence is ungrammatical. So far, what we have seen is nothing unexpected. However, (39) is a grammatical sentence although the predicate is *kiiroi*. This contrast shows that *kiiroi* 'yellow' is an individual-level predicate for the dandelion, for it is (usually considered to be) always yellow. The maple, however, is green in spring and summer, and turns red or yellow in autumn. Thus the predicate *kiiroi* is stage-level, rather than individual-level, as applied to the maple; therefore the HIRC sentence (39) is grammatical.

These examples show that the context or the speaker/hearer's factual knowledge is important for the distinction between stage-level predicates and individual-level predicates.

Part II: Head-Internal Relative Clauses and Negation
Taisuke Nishigauchi

5.   Conditions on HIRC

In Part II, we will discuss some specific problems of negation in HIRC constructions. Before proceeding, it is necessary to clarify the key notions related with the licensing of HIRC: existential implication and existential closure. These two notions are related with existential quantification, typically connected with indefinite NPs and weak determiners (in the sense of Milsark (1974)), but they are in principle independent notions.

Existential implication can be obtained from any sentence containing an indefinite NP or NP with a weak determiner, as long as there is no operator or scope-taking element that takes scope over that NP. Thus, existential implication is available in (40a), as long as (40b) is possible as a logical representation for it.

(40)   a. John believes Mary owns a cat.

b. $\exists x[\text{cat}(x)][\text{believe}(\text{John}, \text{own}(\text{Mary}, x))]$

On the other hand, existential closure is an operational notion that plays a role in mapping syntactic structure to logical representation. For example, given a simple sentence: *John owns a cat*, the indefinite NP *a cat* may or may not be treated as a quantificational NP. If it is, it will be subject to QR. If it is not, it is treated as a free variable at the level in which VP containing it is represented at LF:

(41) $\lambda u[\text{cat}(x) \wedge \text{own}(u, x)]$

If there is nothing higher in the structure that provides quantificational force to the free variable, existential closure applies to this domian, giving rise to a representation:

(42) $\lambda u \exists x[\text{cat}(x) \wedge \text{own}(u, x)]$

Existential implication is available if there is nothing above this structure which prevents it, such as negation or so-called 'opacity-inducing' elements such as thought verbs or modal auxiliaries.

Returning to HIRCs in Japanese, what we are going to argue is the following:

(43) HIRC is licensed with respect to an NP α as its internal head if the following conditions are met:

1. α contains a weak determiner;
2. VP containing α is subject to existential closure in its mapping to the logical representation;
3. existential implication is available involving α.

6. HIRCs and Negation

Hayashi (2003) presents a number of arguments for the analysis of HIRCs based on existential implication and existential closure in the sense of Heim (1982) and Diesing (1992).

On Hayashi's (2003) analysis, genuine cases of HIRCs are possible only when existential implication involving the indefinite NP that serves as the internal head is available within the clause constituting the HIRC. Existential implication has its basis on existential closure in the sense of Heim (1982), and more specifically Diesing (1992), who claims that the domain of existential closure is the syntactic domain of VP.

In this section, we discuss the relevance of negation to the licensing of HIRCs. As we see in example (44), negation in the clause purporting to constitute an HIRC leads to ungrammaticality.

(44) *[[Taroo-ga ronbun-o kaka-nakatta]-no]-ga zyaanaru-ni notta
     Taroo-NOM paper-ACC wrote-did-not-*no*-NOM journal-on   appeared
     '*Taro didn't write *papers* and *they* appeared in the journal.'

At first sight, the problem raised by the ungrammaticality of (44) appears to be of a semantic nature having to do with existential implication. Indeed we will see in the next subsection that this is the case. What we will see below, however, is that consideration of the relevance of negation to the grammaticality of HIRCs reveals some syntactic aspects of the problem, relating to the domain in which existential closure applies.

6.1 Negation and Existential Implication

The ungrammaticality of (44) stems from the failure of existential implication in the clause internal to the HIRC. The logical representation of the clause comprising the HIRC (45) should include (46).

(45) Taroo-ga   ronbun-o kaka-nakatta (koto)
     Taroo-NOM paper-ACC wrote-did-not that
     'Taro didn't write *a paper*.'

(46) NOT $\exists x[\text{paper}(x) \wedge \text{wrote}(\text{Taro}, x)]$

In terms of the Mapping Hypothesis, existential closure does apply in the domain of VP, but the presence of negation prevents existential implication with respect to a set of papers such that Taro wrote them.

Example (45) involves the verb *kak* 'write', a verb denoting creation or emergence. Negation of verbs of creation or emergence necessarily precludes existential implication — if you do not write a paper, no paper exists. In contrast, verbs such as *yom* 'read' behave differently in that negation of these verbs can permit existential implication. Sentence (47) can have either (48a) or (48b) as its logical representation.

(47) Taroo-ga   ronbun-o yoma-nakatta (koto)
     Taroo-NOM paper-ACC read-did-not that
     'Taro didn't read *a paper*.'

(48)   a. $\exists x[\text{paper}(x) \wedge \text{NOT read}(\text{Taro}, x)]$

       b. $\exists x[\text{paper}(x)] \text{ NOT } [\text{read}(\text{Taro}, x)]$

The reason why existential implication is available in (47) is that the verb *yom* 'read' carries with it the presupposition that there are a set of papers relevant to the domain of discourse such that they can be read by Taro. Therefore, (48b) is more appropriate than (48a) as a logical representation for the meaning in question of (47) in that (48b) contains the restrictive clause indicating the presupposition of the existence of a set of papers (Diesing (1992)).

     Now, let us consider the following sentence, which differs from (44) minimally with respect to the choice of verb.

(49) *[[Taroo-ga ronbun-o yoma-nakatta]-no]-ga zyaanaru-ni notta
     Taroo-NOM paper-ACC read-did-not-*no*-NOM journal-on   appeared
     'Taro didn't read *a paper* and *it* appeared in the journal.'

This sentence is as ungrammatical as (44), despite the fact that existential implication is permissible in the clause internal to the HIRC, as we saw with respect to (47).

     The reason for the ungrammaticality of (49) is different from that of (44) — while (44) is ungrammatical because existential implication fails in the clause comprising the HIRC, existential implication can hold in the clause comprising the HIRC in (49). The problem with (49) is that *existential closure* does not apply in the clause of HIRC.

     In order for the existential operator to take scope wider than negation, the logical representation must involve a restrictive clause outside the domain of negation, as in (48b). The semantic effect of the presence of this restrictive clause is that there is a presupposition that there are a set of papers relevant to the domain of discourse. For this reason, the indefinite NP appearing within the HIRC must have the presuppositional interpretation on this reading, and the logical representation of (49) must contain the following.

(50) $\exists x[\text{paper}(x)] \text{ NOT } [\text{read}(\text{Taro}, x)]$

     Syntactically as well, the indefinite NP must be interpreted outside the domain of NegP, which is above VP.

(51)
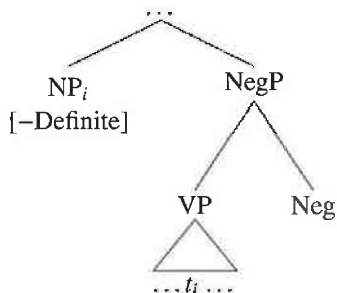
This structure precludes the indefinite NP from participating in existential closure — rather, the indefinite NP is subject to QR, being interpreted outside VP.

To see that this analysis is on the right track, let us consider 'VP shell' constructions involving negative implication in the next subsection.

6. 2 'VP Shells' with Negative Implication

In this subsection, we consider sentences involving compounds consisting of two verbs like the following.

(52) a. Taro-ga hon-o   1-satu kaki { -kake / -sokone } ta
           -NOM book-ACC one-CL write about-to fail-to   PAST
           'Taro {was about to / failed to} write one book.'

   b. Taro-ga hon-o   1-satu yomi { -kake / -sokone } ta
           -NOM paper-ACC one-CL read   about-to fail-to   PAST
           'Taro { was about to / failed to } read one book.'

Syntactically, we assume that these sentences involve a 'VP-shell' construction in which the second member of the V–V compound is the head of the higher VP.

(53)
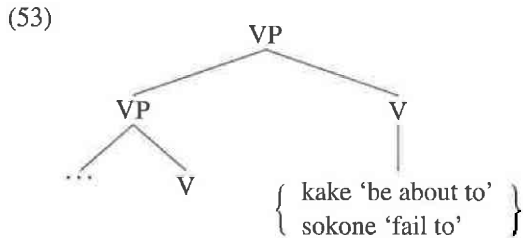
For syntactic and semantic properties of this type of construction, cf. Nishigauchi (1993) and Koizumi (1995).

What is relevant to the present discussion is that the higher (or the second) V of the examples in (52) carries negative implication, so that sentences (52a, b) have the implication that Taro did not write or read a book. Further, (52a) involves in the lower VP a verb of creation or emergence while (52b) contains a verb presupposing the existence of the set of objects denoted by the object NP. As was the case with negative sentences, (52a), with the verb of creation or emergence, implies only the non-existence of a book written by Taro, while (52b) permits a reading with existential implication on the set of books. This distinction is reflected in the contrast in grammaticality in the following sentences with HIRCs:

(54) a. *[Taro-ga hon-o   1-satu kaki { -kake / -sokone } ta]-no -ga
             -NOM book-ACC one-CL write about-to fail-to   PAST   -NOM

       teeburu-no ue-ni aru.
       table-GEN   on   is

       'Taro {was about to / failed to} write one book, and it is on the table.'

b. [Taro-ga hon-o   1-satu yomi { -kake / -sokone } ta]-no -ga
    -NOM book-ACC one-CL read about-to fail-to   PAST   -NOM

teeburu-no ue-ni aru.
table-GEN   on   is

'Taro { was about to / failed to } read one book, and it is on the table.'

What is of particular interest here is the grammatical status of (54b), which is in marked contrast to the ungrammatical (49), which we repeat here:

(49) *[[Taroo-ga <u>ronbun</u>-o yoma-nakatta]-no]-ga zyaanaru-ni notta
    Taroo-NOM paper-ACC read-did-not-*no*-NOM journal-on appeared
    'Taro didn't read *a paper* and *it* appeared in the journal.'

Sentences (54b) and (49) share the properties in such a way that both involve negation (overt in (49), implicit in (54b)), and existential implication is available with respect to the indefinite NP purporting to serve as the internal head of HIRC.

This distinction in overt and implicit negation is reflected on the syntactic structure: While overt negation involves the projection of Neg (part of Inflection), implicit negation does not involve any ingredient of Infl, and is realized in the VP shell structure (53). Thus, in the case of (53), it is possible to apply existential closure at the higher VP level, so we obtain the following as part of the logical representation for this sentence:

(55) $\exists x[\text{book}(x) \wedge \text{fail}(\text{read}(\text{Taro}, x))]$

In this, we are assuming that *sokone* 'fail' is a Raising Verb which takes the complement clause as its argument.

6.3 Negation and Complementation

In 6.1, we observed that any construction involving overt negation in the HIRC clause leads to ungrammaticality, and the reason was that in order for existential implication to hold the indefinite NP must take scope outside NegP, which is outside VP, in which case existential closure in the sense of Diesing (1992) cannot apply, since it takes VP as its domain.

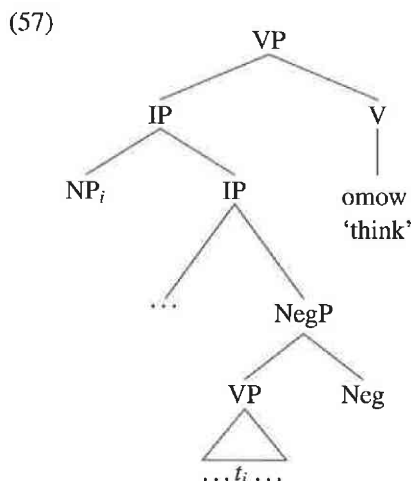From this viewpoint, the grammaticality of the following HIRC sentence is of great interest.

(56) [Hanako-ga [Taroo-ga <u>ronbun</u>-o kaka-nakatta] to
    -NOM   -NOM paper-ACC write-did-not- that

omotta -no]-ga zyaanaru-ni notta
thought -*no*-NOM journal-on appeared

'Hanako thought that Taro didn't write *a paper* and *it* appeared in the journal.'

This sentence is considerably better than sentences like (49), which also involves negation. Notice, further, that (56) involves the verb *kak* 'write', a creation verb, which we have seen in the previous sections is subject to more stringent restriction with respect to existential implication than verbs which ensure existential presupposition on the NP appearing in the object position.

The grammaticality of this sentence hinges on the possibility for the indefinite NP to take wide scope, which leads to existential implication. We saw in 6.1 that in order for an indefinite NP to take scope within a simple clause with negation, the indefinite NP must be interpreted in

a position higher than NegP, which means it must be outside VP, a domain in which existential closure takes place. This was our explanation for the ungrammaticality of (49).

However, if there is a higher V governing the negative clause, it becomes possible for existential closure to apply in the higher projection headed by that verb. Syntactically, the indefinite NP should be adjoined to some projection higher than NegP of the complement clause in order to take scope wider than negation. So it may be adjoined to IP, if the complementizer *to* 'that' does not project, or to CP, if the complementizer does project. Let us suppose the former is the case. We would obtain the structure schematically represented as (56).

(57)

```
                    VP
                  /    \
                IP      V
              /   \     |
           NP_i    IP   omow
                  /  \  'think'
                ...   NegP
                     /    \
                   VP      Neg
                  /  \
                 /____\
                ...t_i...
```

In this structure, the indefinite NP is adjoined to the complement clause IP, which does not dominate the indefinite NP in the technical sense based on segments (May (1985)) since only one segment of IP contains this NP. Thus the indefinite NP is immediately dominated by VP by definition.

This structure makes it possible to apply existential closure in the VP headed by *omow* 'believe', since the indefinite NP is now immediately dominated by this VP, which yields the following representation.

(58) $\lambda u[\exists x[\text{paper}(x) \wedge \text{believe}(u, \text{NOT}(\text{write}(\text{Taro}, x)))]]$

This accounts for the grammatical status of (56).

On the other hand, if we add a negative element *nani-mo* 'anything' or 'nothing' in the complement clause of (56), the HIRC turns out to be totally ungrammatical.[9]

(59) *[Hanako-ga [Taroo-ga <u>ronbun-o</u> nani-mo kaka-nakatta] to
　　　　　　-NOM　　　　　-NOM　paper-ACC nothing　write-did-not- that

　　omotta -no]-ga zyaanaru-ni notta
　　thought -*no*-NOM journal-on　appeared

　　'Hanako thought that Taro didn't write *any paper* and *it* appeared in the journal.'

---

[9] Watanabe (2002) claims that *nani-mo* should be considered a 'negative concord' element which has the meaning of 'nothing', rather than a negative polarity item meaning 'any'.

This is because the presence of the negative element *nani-mo* forces the indefinite NP to be interpreted within the complement clause, together with the negative element itself, which must be licensed in the NegP of the complement clause. Therefore, it is impossible to apply existential closure involving the indefinite NP on the higher VP headed by *omow* 'think', which accounts for the ungrammaticality of (59).

Now, the HIRC in the following sentence is ungrammatical, in marked contrast to (56).

(60)*[Hanako-ga [Taroo-ga <u>ronbun</u>-o kai-ta] to
            -NOM   -NOM paper-ACC wrote   that

    omowa-nakatta -no]-ga zyaanaru-ni notta
    thought-not   -*no*-NOM journal-on   appeared

    'Hanako didn't think that Taro wrote *a paper* and *it* appeared in the journal.'

In order for the indefinite NP to take wide scope in keeping with the requirement for existential implication, it has to be interpreted in a position higher than NegP, outside VP of the matrix clause. Therefore existential closure cannot be applied in the matrix VP. Notice that it is possible to apply existential closure in the lower clause, but the presence of negation in the matrix clause prevents existential implication involving the indefinite NP. Therefore, there is no way the HIRC can be licensed with the indefinite NP in question, and this accounts for the ungrammaticality of (60).

7.   Conclusion

We have examined the HIRC in Japanese, which exhibits some interesting properties in both syntax and semantics. First, we have shown that only weak NPs in the sense of Milsark (1974) can be the internal head whereas strong NPs, specifically definite NPs and quantifiers such as *subete(no)* 'every' and *hotondo(no)* 'most' cannot. Second, the predicate inside the HIRC must be stage-level, whereas an individual-level predicate inside the HIRC leads to an ungrammatical sentence.

Many of these properties have remained unnoticed in the literature as far as we are aware, and previous approaches cannot explain them without further assumption or extension.

We hypothesize that existential implication is crucial to license the HIRC. The internal head must have a reference given by existential implication. Existential implication is assumed to be based on existential closure by Heim (1982). Further, we adopt Diesing's (1992) Mapping Hypothesis, and assert that syntactically, the internal head must be inside VP. This hypothesis can explain the properties of the HIRC straightforwardly.

First, at the level of LF, weak NPs are assumed to occur inside VP whereas strong NPs are assumed to occur outside VP due to QR. Thus our approach correctly predicts that only weak NPs can be the internal head. Second, Diesing (1992) states that the subject NP of a stage-level predicate occurs inside VP whereas that of an individual-level predicate occurs outside VP. If this is also true for Japanese, our approach straightforwardly explains the contrast between a stage-level embedded predicate and an individual-level embedded predicate.

In Part II of the present article, we discussed some specific problems of negation in HIRC constructions. Semantically, negation affects HIRC constructions because it affects existential implication when negation takes scope over the indefinite NP which serves as the internal head. However, even when the indefinite NP takes scope over negation and thus existential

implication is possible, HIRC sentences turn out to be ungrammatical. The reason for this lies with the Mapping Hypothesis: the indefinite NP taking scope over negation must occupy a position outside VP, and hence cannot take part in existential closure. We also considered cases in which an HIRC sentence with negation is embedded in a position governed by a verb of saying or thought. We observed that HIRC sentences with negation turn out to be grammatical in the embedded position. The reason for this is that the indefinite NP within the HIRC has a chance of being interpreted within the higher VP, in conformity with the Mapping Hypothesis.

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