

Degree Variables by *Choose Degree* in *Izyooni* ‘Than’-Clauses

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Abstract

Clausal *izyooni* ‘than’-comparatives in Japanese allow *izyooni* ‘than’-clauses with their degree positions filled. I consider them a degree version of Internally Headed Relative Clauses (IHRCs). In this preliminary study, I adopt Gross and Landman’s (2012) *Choose Role* analysis of IHRCs in Japanese and propose a similar functional category *Choose Degree*, which “re-opens” a degree variable position for “closed” *izyooni*-clauses. This makes it possible for once closed *izyooni*-clauses to denote a set of degrees.

1 Introduction

Japanese comparatives have recently attracted wide attention in syntax and semantics. Most of the previous works are concerned with *yorimo* ‘than’-comparatives. However, there is another ‘than’-comparative in Japanese, as illustrated in (1). Comparatives of this type are called *izyooni* ‘than’-comparatives.

Interestingly, *izyooni*-comparatives have the implication that the given degrees in the embedded clauses are “large” (Hayashishita 2007). For instance, (1) implies that Mary is smart. Consequently, Susan in the matrix clause is considered to be smart as well.

- (1) Suusan wa [Mary ga kasikoi]
Susan Top Mary Nom smart
-izyooni kasikoi.
than smart
‘Susan is smarter than Mary is.’
(Implication: Mary is smart.)

Such implication is not observed in the *yorimo* counterpart nor in the English equivalent. (2) with *yorimo* is even ungrammatical.¹

- (2) *Suusan wa [Mary ga kasikoi]
Susan Top Mary Nom smart
-yorimo kasikoi.
than smart
‘Susan is smarter than Mary is.’

- (3) Susan is smarter than Mary is.
(Not implied: Mary is smart.)

For the purpose of our discussion, I will call the degree implication of *izyooni*-comparatives a “positive implication.” This is because the implication in (1) is intuitively the same as the interpretation of its corresponding positive sentence given in (4), where the null POS operator induces the interpretation that Mary’s degree of smartness is large. The truth conditions of (4) are given in (6).

¹ As for why (2) is ungrammatical, the arguments are not settled yet. See Snyder et al. (1995), Beck et al. (2004), Kennedy (2009), and Sudo (2014), among others.

- (4) Mary ga \emptyset_{POS} kasikoi.
 Mary Nom smart
 ‘Mary is smart.’

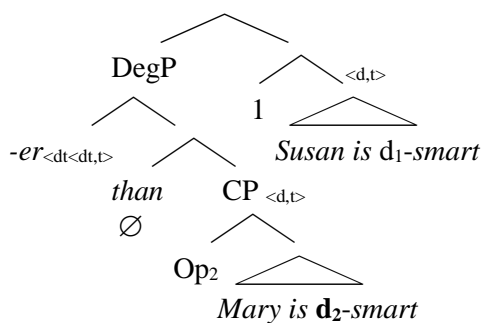
(5) $[\emptyset_{\text{POS}}] \text{ }^{\text{g}} = \lambda P \in D_{\langle d, t \rangle} \exists d [P(d) \wedge d > d_{\text{standard in } c}]$

(6) $\exists d [\text{Mary is } d\text{-smart} \wedge d > d_{\text{standard in } c}]$

I assume that the positive implication in (1) comes from the POS operator that occupies the degree variable position of *kasikoi* ‘smart’ in the *izyooni*-clause.

This may sound odd. Normally, such degree positions are abstracted over and occupied by a degree variable *d*. Therefore, the position cannot be filled by POS. (7) is the LF structure of the English example in (3). The degree variable position of the *than*-clause is occupied by d_2 , which is bound by an operator. Note that I assume *than* in this case is semantically null and indicate it with \emptyset .

(7) Clausal *than*-comparatives in English



However, notice that Japanese is known to have “closed” relative clauses, namely, Internally Headed Relative Clauses (IHRCs). Consider the example in (8). It intuitively means that Taro brought cookies that Yoko put in the refrigerator. However, the object position of *ireteoita* ‘put’ in the embedded clause is overtly filled by *kukkii* ‘cookies.’

- (8) Taro wa [_{CP} Yoko ga reezooko ni
 Taro Top Yoko Nom refrigerator in
kukkii_i o sukunakutomo mittu
cookie Acc at.least three.CL
 ireteoia] no_i o paatii ni mottekita.
 put NM Acc party to brought

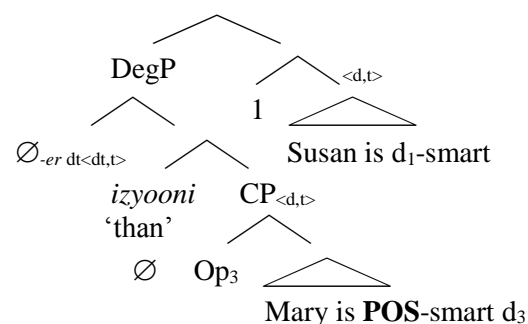
- lit. ‘Taro brought [Yoko put at least three **cookies** in the refrigerator]-NM to the party.’
 (Yoko put at least three **cookies** in the refrigerator, and Taro brought them to the party.)

(Grosu and Landman 2012)

Then, *izyooni*-clauses with filled degree positions can be captured as a degree version of IHRCs. If so, some analyses of IHRC can apply to closed *izyooni*-comparatives.

The IHRC construction is a popular topic in syntax/semantics studies of Japanese. One such study is Grosu and Landman (2012). They propose a functional category *Choose Role* (*ChR*), which “re-opens” an individual variable position for a closed proposition. I propose a similar functional category *Choose Degree* (*ChD*), which re-opens a degree variable position for a closed *izyooni*-clause. This straightforwardly explains how (1) is made possible with the positive implication: The original degree position of *kasikoi* ‘smart’ is occupied by the POS operator, and abstraction over degree takes place due to the newly created degree variable position by *ChD*. The LF of (1) is roughly schematized as (9), where d_3 is the degree variable position created by *ChD*.

(9) Clausal *izyooni*-comparatives in Japanese with “closed” *izyooni*-clauses



The organization of this paper is as follows. Section 2 introduces another example of *izyooni*-comparatives, in which the degree argument position of the *izyooni*-clause is filled with an overt degree item. In Section 3, I review Grosu and Landman’s (2012) *ChR* analysis of IHRCs in Japanese. Then, I propose a similar functional category *ChD* and show how it accounts for *izyooni*-comparatives with filled degree positions.

Section 4 discusses how our analysis of *ChD* differs from previous studies of *izyooni*-comparatives.

2 *Izyooni*-Clauses with Filled Degree Positions

As already mentioned, I assume that the positive implication of (1), repeated below in (10), comes from an invisible POS operator that occupies the degree position of *kasikoi* ‘smart’ in the *izyooni*-clause.

- (10) Suusan wa [Mary ga Ø_{POS} kasikoi]
 Susan Top Mary Nom smart
 -izyooni kasikoi.
 than smart
 ‘Susan is smarter than Mary is.’
 (Implication: Mary is smart.)

If this assumption is correct, it is predicted that the degree position can be filled by items other than the POS operator, including overt ones. This prediction is borne out. In order to show the relevant data, I will take several steps. It is known that some dimensional adjectives take overt measure phrases. For instance, in the English sentence in (11), **10 pages** occupies the degree position of *long*, and it represents the whole length of the paper.

- (11) This paper is **10 pages** long.

Japanese *nagai* ‘long’ also takes a measure phrase, e.g., *2 peeji* ‘two pages,’ as shown in (12). (12) is what will appear in the complement of *izyooni* shortly.

- (12) Ano peepaa wa **2 peeji** nagai.
 that paper Top **2 page** long
 ‘That paper is **2 pages** longer.’
 Not: ‘That paper is 2 pages long.’

However, (12) does NOT mean ‘That paper is 2 pages long.’ It rather has the comparative interpretation ‘That paper is 2 pages longer (than a given standard).’ It is known that measure phrases for Japanese dimensional adjectives always represent differential degrees. (Snyder et al. 1995, Beck et al. 2007, a.o.) The comparative semantics

of (12) can be hard to see because Japanese does not employ overt comparative morphemes like *-er* in English. I assume there is a null comparative operator in Japanese. The point of (12) is that the length of ‘that paper’ is overtly shown as ‘**2 pages more** (than a given standard).’ To my knowledge, this the best example of overt degree item in Japanese.

Now consider (13). Its *izyooni*-clause is identical to (12). (13) means that ‘this paper’ in the matrix clause is longer than ‘that paper’ in the embedded clause, which is ‘**2 pages more**’ than a contextually given standard.

- (13) Kono peepaa wa [ano peepaa ga
 this paper Top that paper Nom
2 peeji nagai]-izyooni nagai.
2 page longer than long
 lit. ‘This paper is longer than [that paper is **2 pages** longer (than a given page limit).]’

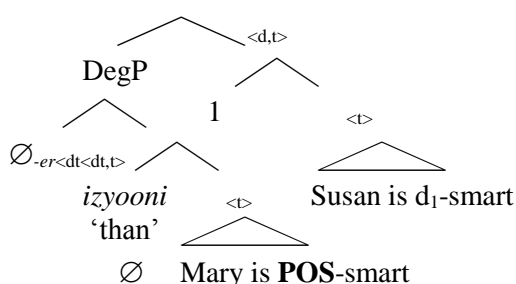
In (13), the standard of comparison for the embedded comparative sentence is implicit, as indicated in parentheses in the translation. If one does not mind a more complex sentence, it is possible to have it overtly. (14) has the extra *than* phrase ‘than the page limit’ within the *izyooni*-clause. The length of ‘that paper’ is overtly shown as ‘**2 pages more than the page limit**.’

- (14) Kono peepaa wa [ano peepaa ga
 this paper Top that paper Nom
maisuu [seigenn yorimo] 2 peeji nagai]
page limit than 2 page long
 -izyooni nagai.
 than long
 lit. ‘This paper is longer than [that paper is **2 pages** longer **than the page limit**.]’

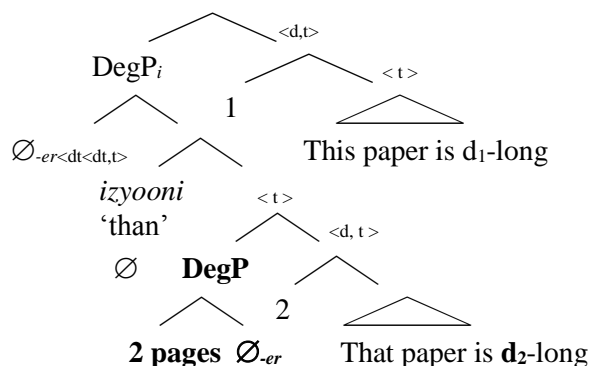
It should be noted that (13) and (14) are complicated, and not every speaker is comfortable with them. There are variations in acceptability among speakers. The language consultants in this study judged the sentences acceptable or at least marginally acceptable. The reason for the variation in acceptability is not clear at this point. However, the difference between such *izyooni*-comparatives and the corresponding English sentences is very clear. In English, *than*-clauses with filled degree positions are never acceptable.

The problem of (1) and (13) is their meanings should not be calculable due to type mismatch, contrary to our intuitions. In both (1) and (13), the degree position in the *izyooni*-clause is filled. To be more precise, it is filled in different ways in LF. In (15), the null POS operator occupies the degree argument position. In (16), the embedded *izyooni*-clause itself is a comparative sentence. Thus, the degree argument position of *nagai* ‘long’ is bound by DegP within the *izyooni*-clause. The point is that in both cases, the *izyooni*-clauses are closed and they denote type $\langle t \rangle$.

(15) LF of (1): Type mismatch



(16) LF of (13): Type mismatch



Type mismatch is already obvious in (15) and (16). Following the standard assumption of comparative operator (von Stechow 1984 a.o.), I assume that the Japanese null comparative operator \emptyset_{er} is type $\langle dt \langle dt, t \rangle \rangle$, as shown in (17).²

$$(17) \quad [\emptyset_{er}]^g = \lambda D_1 \langle d, t \rangle . \lambda D_2 \langle d, t \rangle . \max(D_2) > \max(D_1)$$

² I also assume that *izyooni* is semantically null, and represent it with \emptyset in LF structures.

It requires the first argument to be type $\langle d, t \rangle$. However the complement of *izyooni* denotes $\langle t \rangle$ in (15) and (16).

Despite this type mismatch, (1) and (13) are intuitively well formed. How does this happen? In the next section, I will propose a functional category of *ChD* that creates an additional degree variable position of type $\langle d \rangle$.

3 Choose Degree

The problem we saw in the previous section is that the *izyooni*-clauses are “closed” and appear to be type $\langle t \rangle$. This is a rare phenomenon for clausal *than*-comparatives. However, it is rather a familiar phenomenon in IHRC constructions in Japanese and other languages.

Relative clauses are normally a set of individuals. However, in the IHRC construction in (18), repeated from (8), all the argument positions are filled, including the object position. In other words, the sentence is “closed” and appears to be type $\langle t \rangle$.

(18) Taroo wa [_{CP} Yoko ga reezooko ni
 Taroo Top Yoko Nom refrigerator in
kukkii; o sukunakutomo mittu
cookie Acc at.least three.CL
 ireteoia] no_i o paatii ni mottekita.
 put NM Acc party to brought
 lit. ‘Taro brought [Yoko put at least three
cookies in the refrigerator] to the party.’
 (Yoko put at least three cookies in the
 refrigerator, and Taro brought them to the
 party.)

(Grosu and Landman 2012)

There has been a proposal to solve the problem. Then, let us apply it to *izyooni*-comparatives.

In this section, I will review how Grosu and Landman (2012) analyze (18). They propose a functional category *ChR* that re-opens an individual degree variable position for the closed IHRC. Then, I propose a similar functional category *ChD*, which creates a degree variable position for a closed *izyooni*-clause.

3.1 Gross and Landman (2012)

Grosu and Landman’s (2012) definition of *ChR* is given in (19). *ChR* is a functional category that

takes E , a set of events that is provided by the VP as its sister. The role of ChR is to create an additional individual variable position for a closed sentence. C_E is the *Role Choice* function that chooses an argument of event e and gives an individual variable position x for the chosen argument. Then, operator movement takes place from the newly created position of x .

$$(19) \llbracket ChR \rrbracket^g = \lambda E \lambda x \lambda e. E(e) \wedge C_E(e) = x$$

(Grosu and Landman 2012: 169)

The derivation a hypothetic IHRC proceeds as follows. Suppose α is a denotation of E .

- (20) a. ChR takes α :
- $$\lambda x \lambda e. \alpha(e) \wedge C_\alpha(e) = x$$
- b. (20a) takes a degree variable created by operator movement:
- $$\lambda e. \alpha(e) \wedge C_\alpha(e) = x$$
- c. Existential closure of event:
- $$\exists e[\alpha(e) \wedge C_\alpha(e) = x]$$
- d. Lambda abstraction over x by the operator movement:
- $$\lambda x. \exists e[\alpha(e) \wedge C_\alpha(e) = x]$$
- (Grosu and Landman 2012: 169–170)

For example, the IHRC of (13) is analyzed as follows. C_E picks the theme of the putting event, i.e., cookies, and gives an extra variable position x . When operator movement takes place from the position of x to SpecCP, the clause denotes a set of x . This is simply put as in (21), and the denotation of (21) is in (22).

$$(21) \llbracket CP Op_i [TP Yoko \text{ put at least three cookies } x_i] \rrbracket$$

$$(22) \lambda x. \exists e[\text{PUT}(e) \wedge \text{Ag}(e) = \text{Yoko} \wedge \text{Th}(e) \in * \text{COOKIE} \wedge |\text{Th}(e)| \geq 3 \wedge \text{Into}(e) = \sigma(\text{FR}) \wedge \mathbf{Th}(e) = \mathbf{x}]$$

(Grosu and Landman 2012: 180)

Grosu and Landman’s (2012) event-based analysis is meant to capture their observation that possible internal heads are limited to “a participant in an eventuality associated with the entire relative clause and does not permit an account of data in which the internal head is more deeply embedded nor of the sensitivity of such embedding to island constraints” (p. 164). For instance, it correctly

rules out (23), where the intended internal head ‘new hypothesis’ does not participate in the praising event of the IHRC. Also, the newly created variable position x is in an island, as shown in the scheme in (24), which causes an island violation.

$$(23) * \text{Mary ga} \quad [\text{John ga} \quad [\mathbf{atarasii} \quad \mathbf{kasetu}_i \\ \text{Mary Nom John Nom new hypothesis} \\ \text{o teiansita gakusee}] \text{o homete ita no}_i] \\ \text{Acc proposed student Acc praise had NM} \\ \text{no kekkan o sitekisita.} \\ \text{Gen defective Acc pointed.out} \\ \text{‘John praised the student who proposed a new} \\ \mathbf{hypothesis, and Mary pointed out a defect in} \\ \mathbf{it.}’$$

$$(24) \llbracket CP Op_i [TP John \text{ praised } [DP the student who \\ \text{proposed a new hypothesis } x_i]] \rrbracket$$

In the next subsection, I will propose a degree version of ChR .

3.2 Creating a Degree Variable Position

We will alter ChR in order to account for *izyooni*-comparatives. Our goal is to propose a functional category that re-opens a degree variable position. In doing so, we need to come up with non-event semantics, because many *izyooni*-comparatives, including (1) and (13), are not eventive.

I propose the functional category *Choose Degree* or ChD in (25) that plays a similar role to that of ChR . ChD takes S , a set of situations, as its sister and creates an additional degree variable position. C_S is the *Predicate Choice* function that chooses a degree predicate in situation s and gives a degree variable position d for the chosen degree predicate.

$$(25) \llbracket ChD \rrbracket^g = \lambda S \lambda d \lambda s. S(s) \wedge C_S(s) = d$$

The derivation of a hypothetical *izyooni*-clause is given in (26). The process is essentially the same as we saw in (20). Suppose β is a denotation of S .

type analysis of IHRC constructions to *izyooni*-comparatives.⁴ The E-type analysis heavily depends on discourse. Without having much syntactic constraints, it is very flexible and it accounts for many peculiar behaviors of *izyooni*-comparatives. At the same time, it suffers from the same problem that Shimoyama (2012) does, namely, overgeneration.

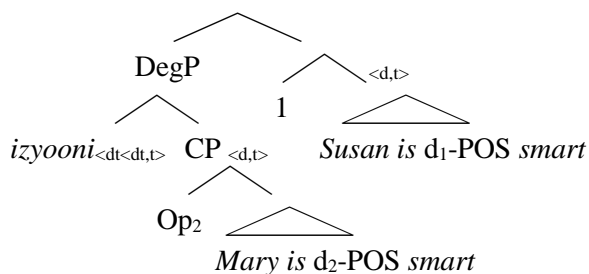
A big advantage of our *ChD* analysis over that of Oda (2014) is that it captures island effects in *izyooni*-clauses observed by Hayashishita (2007). However, the judgments about island effects in *izyooni*-clauses are not settled yet (Kubota 2012). More careful observation is needed before we reach any conclusion.⁵ Another advantage is that our *ChD* analysis is less discourse dependent than the E-type analysis, because the situation variable *s* serves as an anchor and prevent some overgeneration. However, *ChD* analysis still depend on discourse. For instance, in (25) *C_S* chooses a degree predicate in situation *s*. The choice depends on the discourse. At this moment it is not clear how *C_S* behaves when there are more than one degree predicates in its scope.

Hayashishita (2007) and Kubota (2012) are based on more traditional semantics of *than*-comparatives. The parallelism between *izyooni*-comparatives and IHRCs discussed in this paper is not the scope of their analyses. Their primary goal is to account for the positive implication of *izyooni*-comparatives.

Hayashishita (2007) assumes that the positive implication comes from the null POS operator in *izyooni*-clauses. This is the same as we assume for (1). Instead of creating an additional variable position, however, Hayashishita assumes that Japanese POS accommodates a differential degree position, from which operator movement takes place. The same thing happens in the matrix clause. Thus, *izyooni*-comparatives are a comparison of two differential degrees. Based on Hayashishita’s framework, the LF of (1) would be as in (31). Note

that Hayashishita assumes that *izyooni* plays the role of *-er* in English.

(31) LF of (1) by Hayashishita



The truth conditions of (1) would be roughly as in (32). POS is translated as ‘d-degree larger than the contextually given standard in context *c*.’ Put simply, the positive implication is entailed as part of the truth conditions.

$$(32) \max(\lambda d_1. \text{Susan is } d_1\text{-smarter than } d_{\text{standard in } c}) > \max(\lambda d_2. \text{Mary is } d_2\text{- smarter than } d_{\text{standard in } c})$$

At least two major issues arise. First, it is not clear how this analysis accounts for cases like (13), where the relevant degree position is filled by an overt item, not by the POS operator. Second, POS normally represents a “vague” degree cross-linguistically (Kennedy 2007). However, Hayashishita’s POS is not vague as it provides a measurable differential degree. This can be quite controversial.

Kubota (2012) argues that the positive implication in *izyooni*-clauses is a presupposition rather than an entailment. He proposes the lexical entry of *izyooni* for clausal *izyooni*-comparatives as in (33). *Izyooni* serves as a comparative operator, and also it requires degree presupposition for *izyooni*-comparatives. Here, *w₀* represents the actual world. Therefore, the degree in the embedded clause needs to be larger than a given standard in the real world. If not, it would be a presupposition failure. This brings the effect of the positive implication. Note that he adopts the function-based analysis of gradable adjectives proposed by Kennedy (1999), which treats adjectives as denoting functions from individuals to degrees. (1) would be analyzed as in (34).

⁴ Shimoyama’s (1999) E-type analysis is developed from Hoshi (1995). Shimoyama argues against the raising analysis of IHRCs advocated by Ito (1986) and others.

⁵ Interestingly, there is similar variation in acceptability about the island effect on IHRC constructions in Japanese (Watanabe 1992, Grosu and Landman 2012). This is another parallelism between *izyooni*-comparatives and IHRC constructions in Japanese.

(33) $[[izyooni]]^{\text{S}} = \lambda x \lambda \delta \lambda y \lambda w. \delta(y)(w) > \delta(x)(w_0)$
 (defined only if $\delta(x)(w_0) \geq \text{stnd}(\delta)$)
 (Kubota 2012: 42)

(34) $\delta_{\text{smart}}(\text{Susan})(w) > \delta_{\text{smart}}(\text{Mary})(w_0)$
 (defined only if $\delta_{\text{smart}}(\text{Mary})(w_0) \geq \text{stnd}(\delta_{\text{smart}})$)

A major challenge for Kubota is how to deal with the data with overtly filled degree positions, like (13).

Another challenge comes from Kubota's assumption that the positive implication is encoded in *izyooni*-comparatives *per se*. There is an interesting fact that suggests that the positive implication is closely related to gradable predicates rather than the whole *izyooni*-construction. Consider the contrast between (35) and (36). (35) does not employ a gradable adjective or exhibit positive implication. However, the positive implication appears once *takusanno* 'many' is added in the matrix clause, as shown in (36). Note that I assume that there is an elided *takusanno* 'many' in the *izyooni*-clause in (36).

(35) Suusan wa [Mary ga tabeta]-izyooni
 Susan Top Mary Nom ate than
 orenji o tabeta.
 orange Acc ate
 'Susan ate more oranges than Mary did.'
 (Not implied: Mary ate many oranges.)

(36) Suusan wa [Mary ga ___ tabeta]-izyooni
 Susan Top Mary Nom ate than
takusanno aorenji o tabeta.
many orange Acc ate
 'Susan ate more oranges than Mary did.'
 (Implication: Mary ate many oranges.)

Kubota's (34) would predict (35) to have degree presupposition, or he would need to provide a different *izyooni* without degree presupposition.

In contrast, other analyses are somewhat compatible with the lack of positive implication in (35). For Hayashishita (2007), there is no gradable predicate that would host his non-vague POS-operator in *izyooni*-clauses. For Oda (2014), E-type anaphora pragmatically picks degrees without implication. Our *ChD* simply does not apply to (35) because its *izyooni*-clause is not closed.

5 Conclusion and Issues for Further Research

I proposed a lexical category *ChD* that re-opens a variable degree position for a closed *izyooni*-clause. This approach successfully captures the parallelism between *izyooni*-comparatives and IHRCs, namely, closed embedded clauses.⁶ However, many details remain to be worked out.

A question for the bigger picture is the distribution of *ChD*. It remains to be seen whether or not *ChD* applies to other degree constructions in Japanese. Grosu and Landman also raise questions regarding cross- and intra-linguistic distribution of *ChR*. Further comparison between *ChR* and *ChD* may give us some insights.

Eventually, we may want to integrate *ChD* into *ChR* if it is at all possible. *ChD* is a degree version of *ChR*; thus, the common threads between *ChD* and *ChR* are obvious.

Acknowledgments

I thank the anonymous reviewers of PACLIC29 for their helpful comments. I also thank the anonymous reviewers of JK23 in 2013. They are the ones who recommended me to adopt Grosu and Landman (2012). All remaining errors are my own.

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⁶ An anonymous reviewer of PACLIC 29 pointed out that IHRCs are relatively rare in modern Japanese. (S)he also pointed out that correlative *-ni turete* may undergo a similar analysis. Thus it might be better to treat comparative and correlative sentences in Japanese within the same and independent framework.

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