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 \( \not{\text{POS}} \) kasikoi.
Mary Nom smart
‘Mary is smart.’

(5) \[ [\not{\text{POS}}] \varepsilon = \lambda P \in D_{\text{d}1,3} \exists d[P(d) \land d \leq \text{d}_{\text{standard}} \text{ in } c] \]

(6) \( \exists d[\text{Mary is } d\text{-smart} \land d > \text{d}_{\text{standard}} \text{ in } c] \)

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 \( d_3 \), which is bound by an operator. Note that I assume *than* in this case is semantically null and indicate it with [\( \not{\varepsilon} \)].

(7) Clausal *than*-comparatives in English

```
<er<dt<dt,3> Susan is d_1-smart
    \( \not{\varepsilon} \) than CP<dt<dt,3>
    Op_2 Mary is d_2-smart
```

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) Taroo wa [CP Yoko ga reezooko ni
Taroo Top Yoko Nom refrigerator in *
kukkii* o suknakutomo mittu
cookie Acc at.least three.CL
ireteoia] no o paatii ni mottekita.
pull 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

```
<er<dt<dt,3> Susan is d_1-smart
    \( \not{\varepsilon} \) ‘than’ CP<dt<dt,3>
    Op_3 Mary is POS-smart d_3
```

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 żyooni-comparatives.

2  żyooni-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 kasiko ‘smart’ in the żyooni-clause.

(10) Suusaa wa [Mary ga posé kasiko] Susan Top Mary Nom smart -żyooni kasiko. 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 żyooni 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 żyooni-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 ]-żyooni 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 żyooni-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 -żyooni 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 żyooni-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 <t>.

(15) LF of (1): Type mismatch

```
DegP
  \[<d,t>\]
  \[
  \emptyset_{er<dt<dt,t>}
  \]
  izyooni
  ‘than’
  Susan is d1-smart
  \[
  \emptyset
  Mary is POS-smart
  \]
```

(16) LF of (13): Type mismatch

```
DegP
  \[<d,t>\]
  \[
  \emptyset_{er<dt<dt,t>}
  \]
  izyooni
  ‘than’
  This paper is d1-long
  \[
  \emptyset
  DegP
  \]
  \[
  2 pages \emptyset_{er}
  \]
```

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 \(<dt<dt,t>\rangle \), as shown in (17).

(17) \[ \emptyset_{er} \] \( \# = \lambda D_{1<dt}, \lambda D_{2<dt,t>, \max (D_2) > \max (D_1)} \)

It requires the first argument to be type \(<d,t>\). However the complement of *izyooni* denotes \(<t>\) 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 \(<d>\).

3 Choose Degree

The problem we saw in the previous section is that the *izyooni*-clauses are “closed” and appear to be type \(<t>\). 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 \(<t>\).

(18) Taroo wa [\( \emptyset \) Yoko ga reezooko ni
Taroo Top Yoko Nom refrigerator in
kurkii o sukunakutomo mittu
cookie Acc at.least three.CL
ireteoa] no, o paattii 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 Gros 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 $x$.

\begin{equation}
\text{ChR} \quad \varepsilon = \lambda E \lambda x \lambda e. \quad E(e) \land C_E(e) = x
\end{equation}

(Grosu and Landman 2012: 169)

The derivation a hypothetical IHRC proceeds as follows. Suppose $\alpha$ is a denotation of $E$.

(20) a. $ChR$ takes $\alpha$:

\[ \lambda x \lambda e. \quad \alpha(e) \land C_\alpha(e) = x \]

b. (20a) takes a degree variable created by operator movement:

\[ \lambda e. \quad \alpha(e) \land C_\alpha(e) = x \]

c. Existential closure of event:

\[ \exists e[ \alpha(e) \land C_\alpha(e) = x] \]

d. Lambda abstraction over $x$ by the operator movement:

\[ \lambda x \exists e[ \alpha(e) \land C_\alpha(e) = x] \]

(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).

\begin{equation}
\text{ChD} \quad \varepsilon = \lambda S \lambda d \lambda s. \quad S(s) \land C_S(s) = d
\end{equation}

(Grosu and Landman 2012: 180)

Gross 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.

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c. Existential closure of event:

\[ \exists e[ \alpha(e) \land C_\alpha(e) = x] \]

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b. (20a) takes a degree variable created by operator movement:

\[ \lambda e. \quad \alpha(e) \land C_\alpha(e) = x \]

c. Existential closure of event:

\[ \exists e[ \alpha(e) \land C_\alpha(e) = x] \]

d. Lambda abstraction over $x$ by the operator movement:

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(20) a. $ChR$ takes $\alpha$:

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b. (20a) takes a degree variable created by operator movement:

\[ \lambda e. \quad \alpha(e) \land C_\alpha(e) = x \]

c. Existential closure of event:

\[ \exists e[ \alpha(e) \land C_\alpha(e) = x] \]

d. Lambda abstraction over $x$ by the operator movement:

\[ \lambda x \exists e[ \alpha(e) \land C_\alpha(e) = x] \]

(Grosu and Landman 2012: 169–170)
(26) a. ChD takes $\beta$:
\[ \lambda d. \lambda s. \beta(s) \land C_\beta(s) = d \]
b. (26a) takes a degree variable created by operator movement:
\[ \lambda s. \beta(s) \land C_\beta(s) = d \]
c. Existential closure of situation:
\[ \exists s[ \beta(s) \land C_\beta(s) = d] \]
d. Lambda abstraction over $d$ by the operator movement:
\[ \lambda d. \exists s[ \beta(s) \land C_\beta(s) = d] \]

Let us consider how to analyze (1) and (13). Their LF structures are given in (27) and (28), respectively. Unfortunately, it is not clear at this point exactly where ChD is located. I tentatively place it above the embedded clauses.\(^3\) Note that the proposition is now type $\langle s,t\rangle$ due to the situation semantics. Accordingly, the semantic type of the null comparative operator is $\langle d,st\rangle, \langle d,st\rangle, \langle s,t\rangle$. The point is that the complement of each izyooni denotes a set of degrees of type $\langle d,st\rangle$. There is no type mismatch any more.

(27) LF of (1)

(28) LF of (13)

\[ \exists s[\max(\lambda d_1. \text{Susan is } d_1\text{-smart in } s) \land \max(\lambda d_3. \exists d\text{[Mary is } d\text{-smart in } s \land d > d\text{standard in } c] \land \text{Mary’s smartness in } s = d_3)] \]

\[ \exists s[\max(\lambda d_1. \text{This paper is } d_1\text{-long in } s) \land \max(\lambda d_3. \exists d\text{[Paper is } d_2\text{-long } \& C_S(s) = d_3])] \]

The truth conditions of the sentences are expected to be roughly as follows in (29) and (30).

(29) $\exists s[\max(\lambda d_1. \text{Susan is } d_1\text{-smart in } s) \land \max(\lambda d_3. \exists d\text{[Mary is } d\text{-smart in } s \land d > d\text{standard in } c] \land \text{Mary’s smartness in } s = d_3)]$

(30) $\exists s[\max(\lambda d_1. \text{This paper is } d_1\text{-long in } s) \land \max(\lambda d_3. \exists d\text{[Paper is } d_2\text{-long } \& C_S(s) = d_3])]$

In summary, ChD somehow accounts for the two examples with filled izyooni-clauses. However, the analysis above is still preliminary, and there are many gaps left between the LFs and the truth conditions. Especially, it is not clear at this point exactly how $C_S(s)$ provides the degree we want. I will leave these details for further research.

4 In Relation to Other Analyses

What are the advantages of ChD compared to other analyses of izyooni-comparatives? To my knowledge, there are three previous studies of izyooni-comparatives. In this section, I briefly review them and discuss how our analysis of ChD is different from them.

The parallelism between izyooni-comparatives and IHRC constructions has already been pointed out by Oda (2014). Oda attempts to capture the parallelism by applying Shimoyama’s (1999) E-

\[^3\text{ Also, it is not clear exactly where the newly created variables are located in the LF structures. The same question arises for variables created by ChR.}^\]
type analysis of IHRC constructions to izyooni-comparatives. 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. Another advantage is that our ChD analysis 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_3 chooses a degree predicate in situation s. The choice depends on the discourse. At this moment it is not clear how C_3 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

```
[LP]

izyooni <d,t> CP <d,t> Susan is d_1-POS smart

Op_2

Mary is d_2-POS smart
```

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, *w_0* 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).

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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 among 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.
A major challenge for Kuroda 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. 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.

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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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