



1-1-2017

# Toyuu-reduplication and the Structure of Extended Nominal Projections in Japanese

Yuta Tatsumi  
*University of Connecticut*

---

# Toyuu-reduplication and the Structure of Extended Nominal Projections in Japanese

## **Abstract**

This study analyzes one type of reduplication in Japanese, which I refer to as *toyuu*-reduplication, from a syntactic and semantic point of view. In *toyuu*-reduplication, a noun phrase is reduplicated around the particle *toyuu*. This paper shows that *toyuu*-reduplication can be analyzed based on the structure of extended nominal projections proposed by Watanabe (2006, 2010), and Huang and Ochi (2014). More precisely, I propose that *toyuu*-reduplication has the structure that Japanese postnominal numeral classifiers have. The proposed analysis implies that Japanese manifests two means of lexical support for the CI head like Chinese: overt realization of the CI head or noun incorporation.

# ***Toyuu*-reduplication and the Structure of Extended Nominal Projections in Japanese**

Yuta Tatsumi\*

## **1 Introduction**

This study analyzes the underlined noun phrases in (1) from a syntactic and semantic point of view. Within the underlined noun phrase, a bare common noun is reduplicated around the particle *toyuu*. In what follows, I refer to this kind of noun phrase as *toyuu*-reduplication.

- (1) a. kinoo      John-ga      [mado-toyuu-mado]-o      ake-ta.  
yesterday John-NOM window-TOYUU-window-ACC open-PST  
'John opened all the windows yesterday.'  
b. [gakusei-toyuu-gakusei]-ga      kotosi      ronbun-o      kai-ta.  
student-TOYUU-student-NOM this.year paper-ACC write-PST  
'All the students wrote a paper this year.'

This paper shows that *toyuu*-reduplication can be analyzed based on the structure of extended nominal projections proposed by Watanabe (2006, 2010), and Huang and Ochi (2014). I propose that *toyuu*-reduplication has the structure that Japanese postnominal numeral classifiers have.

## **2 Basic Properties of *Toyuu*-reduplication**

In this section, I introduce some basic properties of *toyuu*-reduplication. The first property concerns constituency of *toyuu*-reduplication. Kamio (1983) points out that only a single constituent can be pseudo-clefted. In (2a), *John* is clefted and followed by the copula *da*. Since *John* is a single constituent, the resulting sentence is grammatical. On the other hand, (2b) is ungrammatical because *kinoo* 'yesterday' and *John*, which do not form a single constituent, are clefted in this case.<sup>1</sup>

- (2) a. [ kinoo      [ mado-toyuu-mado]-o      ake-ta-no]-wa      John da.  
yesterday window-TOYUU-window-ACC open-PST-thing-TOP John COP  
Lit. 'It is John that opened all the windows yesterday.'  
b.\*[[ mado-toyuu-mado]-o      ake-ta-no]-wa      kinoo      John da.  
window-TOYUU-window-ACC open-PST-thing-TOP yesterday John COP  
Lit. 'It is yesterday John that opened all the windows.'  
c. kinoo      John-ga      ake-ta-no-wa      [ mado-toyuu-mado]      da.  
yesterday John-NOM open-PST-thing-TOP window-TOYUU-window COP

In contrast to (2b), *toyuu*-reduplication is compatible with a pseudo-cleft construction, as shown in (2c), although the clefted part is a complex item. Given that only a single constituent can be pseudo-clefted, (2c) shows that the two nominals around the particle *toyuu* form a single constituent.

Second, *toyuu*-reduplication shows the maximizing effect, like the English *all* (see Dowty 1987, Brisson 2003). For example, (3a) is true when each and every girl jumped in the lake without any exception, whereas (3b) allows for exceptions and is true even if there is a girl who did not jump in the lake.

- (3) a. The girls all jumped in the lake.  
b. The girls jumped in the lake. (Brisson 2003: 130)

---

\*I would like to thank the audience of PLC 40, Željko Bošković, Takanobu Nakamura, Hiromune Oda, Yohei Oseki, Hiroaki Saito, Yuta Sakamoto, and Akira Watanabe for their helpful comments and suggestions.

<sup>1</sup>See Koizumi (2000) and Takano (2002) for analyses that capture cases where non-constituents appear to be pseudo-clefted.

As shown in (4a), the Japanese counterpart of *all* also shows the maximizing effect. (4a) is not felicitous if John is a student in a given context.

- (4) a.#[subete-no gakusei]-ga ronbun-o kai-ta ga,  
 all-GEN student-NOM paper-ACC write-PST but  
 John-wa ronbun-o kaka-nakat-ta.  
 John-TOP paper-ACC write-NEG-PST  
 ‘All the students wrote a paper, but John did not write a paper.’
- b.#[gakusei-toyuu-gakusei]-ga ronbun-o kai-ta ga,  
 student-TOYUU-student-NOM paper-ACC write-PST but  
 John-wa ronbun-o kaka-nakat-ta.  
 John-TOP paper-ACC write-NEG-PST  
 ‘All the students wrote a paper, but John did not write a paper.’
- c. gakusei-ga ronbun-o kai-ta ga,  
 student-NOM paper-ACC write-PST but  
 John-wa ronbun-o kaka-nakat-ta.  
 John-TOP paper-ACC write-NEG-PST  
 ‘Students wrote a paper, but John did not write a paper.’

The same effect is observed in (4b), where *toyuu-reduplication* is used as a subject phrase. (4b) is also infelicitous if John is a student. In contrast, if a bare common noun is used as a subject, the maximizing effect is not observed, as in (4c).

There is another similarity between Japanese counterpart of *all* and *toyuu-reduplication*. As shown in (5a-b), neither can be used as a predicate of a predicational copular sentence.

- (5) a.\*[John-no musuko]-wa [subete-no gakusei] da.  
 John-GEN son-TOP all-GEN student COP  
 Lit. ‘John’s sons are all students.’
- b.\*[John-no musuko]-wa [gakusei-toyuu-gakusei] da.  
 John-GEN son-TOP student-TOYUU-student COP  
 Lit. ‘John’s sons are all students.’
- c. [John-no musuko]-wa [gakusei] da.  
 John-GEN son-TOP student COP  
 ‘John’s sons are students.’

Again, bare common nouns behave differently; it can appear in a predicate position of predicative copular sentences, as in (5c).

Although *toyuu-reduplication* behaves like universal quantifiers, it also shows different behavior from distributive universal quantifiers. For instance, *toyuu-reduplication* is compatible with collective predicates such as *torikakomu* ‘surround’.

- (6) a.\*[dono kankyaku]-mo John-o torikakon-da.  
 which audience-also John-ACC surround-PST  
 ‘Every audience surrounded John.’
- b. [subete-no kankyaku]-ga John-o torikakon-da.  
 all-GEN audience-NOM John-ACC surround-PST  
 ‘All the audience surrounded him.’
- c. [kankyaku-toyuu-kankyaku]-ga John-o torikakon-da.  
 audience-TOYUU-audience-NOM John-ACC surround-PST  
 ‘All the audience surrounded him.’

(6a) shows that a distributive universal quantifier cannot co-occur with a collective predicate. On the other hand, a non-distributive universal quantifier as in (6b) is compatible with a collective predicate. As shown in (6c), *toyuu-reduplication* is similar to non-distributive universal quantifiers in this respect.

Moreover, *toyuu*-reduplication does not show a selectional restriction on the type of the modified noun. It is well-known that non-distributive universal quantifiers can be combined with a mass noun, whereas distributive universal quantifiers derive a specific interpretation which comes from coercion of a mass noun into a countable one (see Chierchia 1998). For example, (7a) is acceptable only under the interpretation that could be paraphrased as ‘John bought every kind of gold’. In contrast, non-distributive universal quantifiers can modify a mass noun without such a kind-reference reading, as shown in (7b).

- (7) a. #John-wa [ dono kin]-mo kat-ta.  
 John-TOP which gold-also buy-PST  
 ‘lit. John bought every gold.’  
 b. John-wa [ subete-no kin]-o kat-ta.  
 John-TOP all-GEN gold-ACC buy-PST  
 ‘John bought all gold.’  
 c. John-wa [ kin-toyuu-kin]-o kat-ta.  
 John-TOP gold-TOYUU-gold-ACC buy-PST  
 ‘John bought all gold.’

*Toyuu*-reduplication exhibits behavior similar to non-distributive universal quantifiers in this respect, as in (7c). The examples in (6) and (7) then show that there are some similarities between *toyuu*-reduplication and non-distributive universal quantifiers.

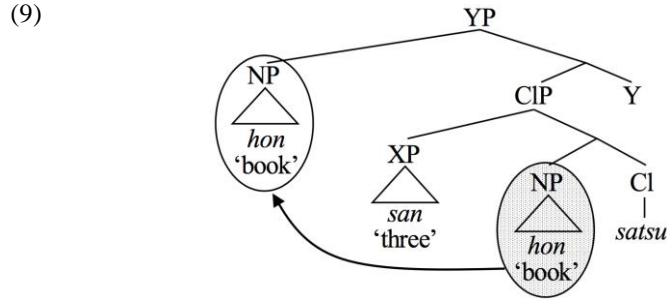
### 3 Proposal

I show that *toyuu*-reduplication can be analyzed based on the structure of extended nominal projections proposed by Watanabe (2006, 2010), and Huang and Ochi (2014). In particular, I propose that *toyuu*-reduplication has the hierarchical structure that postnominal numeral classifiers have. Japanese is a numeral classifier language, where there are three ways to modify a noun phrase, as shown in (8). In (8a), a numeral classifier precedes the modified noun phrase with the intervening particle *-no*. In (8b), a numeral classifier directly follows the modified noun phrase. In these positions, a numeral classifier and the modified noun phrase form a single constituent. In addition to these possibilities, a numeral classifier can be used independently, like an adverb, as in (8c). In this case, a numeral classifier is separated from the modified noun phrase by a case particle.

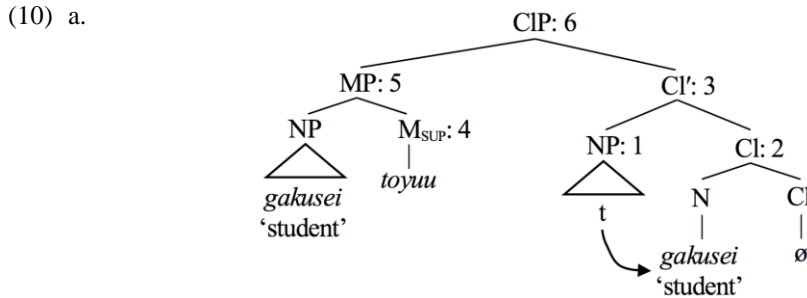
- (8) a. John-ga [ san-satsu-no hon]-o kat-ta.  
 John-NOM 3-CLF-GEN book-ACC buy-PST  
 ‘John bought three books.’ [Prenominal numeral classifier]  
 b. John-ga [hon san-satsu]-o kat-ta.  
 John-NOM book 3-CLS-ACC buy-PST  
 ‘John bought three books.’ [Postnominal numeral classifier]  
 c. John-ga [hon]-o san-satsu kat-ta.  
 John-NOM book-ACC 3-CLS buy-PST  
 ‘John bought three books.’ [Floating numeral classifier]

The relationship among these types of numeral classifiers has received a great deal of attention (e.g., Kitahara 1993, Kawashima 1998, Fukui and Takano 2000, Nakanishi 2007, Huang and Ochi 2014). Here, I focus on a movement analysis of postnominal numeral classifiers proposed by Watanabe (2006, 2010), and Huang and Ochi (2014). Based on independent arguments, they argue that postnominal numeral classifiers have the structure like (9).<sup>2</sup> In other words, the postnominal numeral classifier in (8b) has the structure like (9).

<sup>2</sup>Watanabe (2006, 2010) uses a slightly different notation for the heads of the functional projections. Here, I follow the notation used in Huang and Ochi (2014). However, nothing crucially hinges on this.



In (9), the modified noun is base-generated in the complement position of the head of a classifier phrase (i.e., CIP), and moves to the specifier position of a higher functional projection, which I represent as YP here. Numerals and measure phrases can appear in Spec,CIP. Adopting this analysis, I propose that *toyuu*-reduplication has the same hierarchical structure of extended nominal projections. My proposal for *toyuu*-reduplication is represented in (10).



- b. 1.  $[[\cup \text{gakusei}]] = \lambda y[y \leq \text{STUDENT}_s]$   
 2.  $[[\text{Cl}]] = \lambda P \lambda n \lambda x [P(x) \wedge |x| = n]$   
 3.  $[[\text{Cl}]] = \lambda P \lambda n \lambda x [P(x) \wedge |x| = n] ([[ \cup \text{gakusei} ]])$   
 $= \lambda n \lambda x [\lambda y [y \leq \text{STUDENT}_s](x) \wedge |x| = n]$   
 $= \lambda n \lambda x [x \leq \text{STUDENT}_s \wedge |x| = n]$   
 4.  $[[\text{M}_{\text{SUP}}]] = \lambda y[|y|]$   
 5.  $[[\text{MP}]] = \lambda y[|y|] ([[ \cup \text{gakusei} ]])$   
 $= |\text{STUDENT}_s|$   
 6.  $[[\text{CIP}]] = \lambda n \lambda x [x \leq \text{STUDENT}_s \wedge |x| = n] ([[ \text{MP} ]])$   
 $= \lambda x [x \leq \text{STUDENT}_s \wedge |x| = |\text{STUDENT}_s|]$

First, let us consider the syntactic derivation in (10a). I assume that *toyuu* is combined with a noun phrase which is a copy of the noun phrase in the complement position of the Cl head by sideward movement proposed by Nunes (2001).<sup>3</sup> The relevant steps of the derivation are given in (11).

- (11) a.  $K = [{}_{\text{CIP}} [{}_{\text{NP}} \text{gakusei}]^i \text{Cl}]$   
 b.  $L = \text{toyuu}$   
 c.  $M = [{}_{\text{MP}} [{}_{\text{NP}} \text{gakusei}]^i \text{toyuu}]$   
 d.  $N = [{}_{\text{CIP}} [{}_{\text{MP}} [{}_{\text{NP}} \text{gakusei}]^i \text{toyuu}] [{}_{\text{CIP}} [{}_{\text{NP}} \text{gakusei}]^i \text{Cl}]$   
 e.  $O = [{}_{\text{CIP}} [{}_{\text{MP}} [{}_{\text{NP}} \text{gakusei}]^i \text{toyuu}] [{}_{\text{CIP}} t_{\text{NP}} \text{gakusei-Cl}]$

In (11), I represent the copy of the noun phrase which is incorporated into the Cl head by using  $t_{\text{NP}}$ , to distinguish it from the copy generated by sideward movement. It is important to notice that

<sup>3</sup>This is just one syntactic way to capture reduplication of nouns. We may analyze reduplication around *toyuu* from a morphophonological perspective, too. I leave the details of a morphophonological analysis of *toyuu*-reduplication for future research since the syntactic account seems to be enough to capture the properties of *toyuu*-reduplication we are concerned with here.

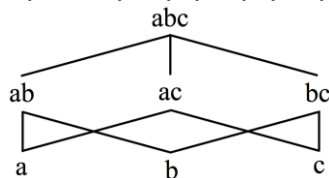
Nunes (2001) assumes that Chain Reduction is regulated by the Linear Correspondence Axiom (LCA) proposed by Kayne (1994). As shown in (10a), the noun phrase in the complement position of the CI head undergoes noun incorporation and forms a complex head. Following Chomsky (1995), I assume that the LCA does not apply word-internally. Since the lower copy is invisible to the LCA in (10a), both copies can be overtly realized.

Crucially, Watanabe (2006) points out that the CI head is realized as a classifier only when numerals appear in Spec,CIP. Since the Spec,CIP is occupied by a measure phrase, which is not a numeral, the CI head is not realized as a classifier in (10a). Following Cheng and Sybesma (1999, 2012), I assume that when the CI head is not overtly realized, a modified noun is incorporated into the CI head. The reason behind this incorporation strategy is that the empty CI head must be licensed by a lexical head, and here noun incorporation is the preferred option, like N-to-D movement discussed by Longobardi (1994). Huang and Ochi (2014) suggested that the driving force of the movement of a noun phrase in (9) may be related to accessibility of the noun phrase from outside, with respect to selectional requirement and/or Case. Given this, if noun incorporation takes place, it is expected that the movement to Spec,YP is not triggered. This is because after noun incorporation, the noun head becomes accessible from outside of the CIP. Therefore, the movement to Spec,YP does not happen in (10a).

As for the semantic calculation, I basically follow Kurafuji (2004), specifically regarding the denotation of the CI head. I assume further that Japanese bare common nouns are mass and they are analyzed as a kind-denoting term (see Chierchia 1998). For instance, *gakusei* ‘student’ has the semantic denotation like  $STUDENT_s$ . For any world/situation  $s$ ,  $STUDENT_s$  is the plural individual which consists of all of the atomic members of the student-kind. Assuming that Japanese bare common nouns can be turned into type  $\langle e,t \rangle$  by the  $^U$  function (see Chierchia 1998, Bošković and Hsieh 2015), I propose that a bare common noun in Spec,CIP can bear the cardinality interpretation by virtue of the presence of *toyuu*, which is a realization of the  $M_{SUP}$  function.

As shown in (10b), the bare common noun *gakusei* ‘student’ is turned into type  $\langle e,t \rangle$  by the  $^U$  function. The CI head is then combined with the type-shifted noun. I assume that a bare common noun in the Spec,CIP can be interpreted as cardinality by virtue of the measurement function  $M_{SUP}$ .  $M_{SUP}$  takes a plural individual and returns the cardinality of the supremum of the plural individual. The cardinality of the supremum corresponds to the number of all of the atomic members of the top node set in a semi-lattice structure. Now, suppose that there are only three students  $a$ ,  $b$ , and  $c$  in the context. In this case, the bare common noun *gakusei* ‘student’ denotes the set given in (12a). Since mass nouns are interpreted as a semi-lattice, the denotation of *gakusei* can be represented as in (12b) (see Bale and Barner 2009).

- (12) a.  $\llbracket \text{student} \rrbracket = \{a, b, c, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}$   
 b.



In (12b), the supremum is the set  $\{a, b, c\}$ . Therefore, as a result of the  $M_{SUP}$  function, we obtain three as the cardinality of a given kind. The constituent composed of the noun and the CI head takes this cardinality as its argument, and the whole CIP results in type  $\langle e,t \rangle$ , as shown in (10b). The denotation in (10b) roughly means that for any  $x$ ,  $x$  is a subpart of the student-kind, and its cardinality is equal to the cardinality of the supremum of the student-kind. Consequently, the whole phrase denotes a maximal individual of the student-kind.

#### 4 Analysis

The proposed analysis can capture the properties of *toyuu*-reduplication discussed in section 2. First, *toyuu*-reduplication must be interpreted as a single nominal constituent since it makes use of

the extended nominal projections, as shown in (10a).<sup>4</sup> Moreover, the proposed analysis can derive the maximizing effect in *toyuu*-reduplication. The cardinality derived from a plural individual always corresponds to the maximum size of a given set because of  $M_{SUP}$ . This gives us the maximizing effect of *toyuu*-reduplication. Although a plural individual may include a non-maximal set, such a set is not chosen because  $M_{SUP}$  requires a maximal individual.

The distribution of *toyuu*-reduplication is also explained. Whatever the account, this property can follow from the similarity between postnominal numeral classifiers and *toyuu*-reduplication. In Japanese predicational copular sentences, quantized nominals cannot be used as a predicate (see Nishiyama 2003, Tatsumi 2014). As shown in (13), a postnominal classifier also cannot appear in a predicate position of the predicate copular sentence, just like *toyuu*-reduplication.

- (13) \*[John-no musuko]-wa [gakusei san-nin] da.  
 John-GEN son-TOP student 3-CLS COP  
 Lit. 'John's sons are all students.'  
 (Intended meaning: 'John's sons have a property of being three students.')

Since *toyuu*-reduplication makes use of the structure of functional nominal projections identical to what postnominal numeral classifiers have, the two are expected to exhibit the same behavior.

The similarities between non-distributive universal quantifiers and *toyuu*-reduplication can also follow from the semantic similarity between postnominal numeral classifiers and *toyuu*-reduplication. As shown in (14), a noun phrase with a postnominal numeral classifier can appear with a collective predicate.

- (14) [kankyaku hyaku-nin]-ga kare-o torikakon-da.  
 audience 100-CLS-NOM he-ACC surround-PST  
 'An audience of one hundred surrounded him.'

We can correctly predict that *toyuu*-reduplication is also compatible with a collective predicate because although *toyuu*-reduplication contains the cardinality of a supremum set, it should be analyzed as an instance of Japanese postnominal numeral classifier. In the same vein, selectional restrictions on the type of the modified noun are also captured. As shown in (15), a measure phrase can modify a mass noun such as *kin* 'gold'.

- (15) John-wa [<sub>NP</sub> kin ichi-kiro]-o kat-ta.  
 John-TOP gold one-kilogram-ACC buy-PST  
 'John bought one kilogram of gold.'

In *toyuu*-reduplication, a noun phrase in Spec,CIP can denote the maximal amount of a given kind, similarly to the postnominal numeral classifier in (15). Thus, *toyuu*-reduplication shows behavior similar to non-distributive universal quantifiers, not because it is an instance of a non-distributive universal quantifier, but because it is an instance of Japanese postnominal numeral classifier.

## 5 Support

The proposed analysis predicts that there should be some constraints on attributive modifiers of nouns in *toyuu*-reduplication. For example, it is expected that prenominal modifiers such as possessor phrases and attributive adjectives can be combined with a whole reduplicated noun. This prediction is borne out as shown in (16).

- (16) a. John-wa [Mary-no [tegami-toyuu-tegami]]-o yon-da.  
 John-TOP Mary-GEN letter-TOYUU-letter-ACC read-PST

<sup>4</sup>Although Watanabe (2006) argues that prenominal and floating numeral classifiers are derived from the structure (9) via snowballing phrasal movement, here I follow Huang and Ochi's (2014) proposal with respect to how to derive other types of Japanese numeral classifiers, in order to avoid an over-generation problem.



- ‘John read all Mary’s letters.’  
 b. John-wa [ hurui [ tegami-toyuu-tegami]]-o yon-da.  
 John-TOP old letter-TOYUU-letter-ACC read-PST  
 ‘John read all old letters.’

Since the semantic type of *toyuu*-reduplication is  $\langle e, t \rangle$ , there is no problem in combining these attributive modifiers with a reduplicated noun. For example, we can make use of the possessor morpheme proposed by Barker (1991) and Larson and Cho (2003) for possessor phrases, and predicate modification proposed by Heim and Kratzer (1998) for attributive adjectives. The semantic denotation of each modifier is given in (17). Both possessor phrases and attributive adjectives can combine with *toyuu*-reduplication via predicate modification, and this option is available because the semantic type of *toyuu*-reduplication is  $\langle e, t \rangle$ .

- (17) a.  $[[\text{poss}]] = \lambda x \lambda y [\text{POSS}(x, y)]$   
 $[[\text{poss} + \text{Mary}]] = \lambda x \lambda y [\text{POSS}(x, y)](m) = \lambda y [\text{POSS}(m, y)]$   
 $[[\text{letter}]] = \lambda z [\text{letter}'(z)]$   
 $[[[[\text{poss} + \text{Mary}] + \text{letter}]]] = \lambda y [\text{POSS}(m, y) \wedge \text{letter}'(y)]$   
 b.  $[[\text{old}]] = \lambda x [\text{old}'(x)]$   
 $[[\text{letter}]] = \lambda z [\text{letter}'(z)]$   
 $[[\text{old} + \text{letter}]] = \lambda x [\text{old}'(x) \wedge \text{letter}'(x)]$

However, it is not possible to modify only the second noun, as in (18).

- (18) a.\*John-wa [ tegami-toyuu-[Mary-no tegami]]-o sute-ta.  
 John-TOP letter-TOYUU- Mary-GEN paper-ACC discard-PST  
 ‘John threw out all Mary’s letters.’  
 b.\*John-wa [ tegami-toyuu-[hurui tegami]]-o sute-ta.  
 John-TOP letter-TOYUU- old letter-ACC discard-PST  
 ‘John threw out all old letters.’

In contrast, although there are some prosodic conditions, when an attributive modifier is combined with the first and second noun, the resulting sentence is acceptable, as shown in (19).

- (19) a.??John-wa [[MARY-no tegami]-toyuu-[ MARY-no tegami]]-o sute-ta.  
 John-TOP Mary-GEN letter-TOYUU- Mary-GEN paper-ACC discard-PST  
 ‘John threw out all Mary’s letters.’  
 b.?John-wa [[hurui tegami]-toyuu-[ hurui tegami]]-o sute-ta.  
 John-TOP old letter-TOYUU- old letter-ACC discard-PST  
 ‘John threw out all old letters.’

In (19a), the capital letters stand for stressed words. Under this prosodic pattern, the acceptability of (19a) is increased. Moreover, it is important to notice here that (19b), where an attributive adjective appears twice in *toyuu*-reduplication, is much better than (19a) without such prosodic pattern. Given these data, I conclude that the degraded status of (19a) has to do with certain prosodic condition, but not semantic or syntactic factors. Therefore, (19) shows that a modified noun can appear in *toyuu*-reduplication only when the first and the second nominal are identical to each other. The proposed analysis can offer an answer to the question why the second noun must be identical to the first one in *toyuu*-reduplication. Since the head noun is reduplicated around *toyuu* by a syntactic copy and merge (i.e., sideward movement), the head noun and its reduplicant must be the same.<sup>5</sup>

Furthermore, the proposed analysis can capture co-occurrence of *toyuu*-reduplication and oth-

<sup>5</sup>The proposed analysis predicts that an attributive modifier can be attached only to the first element in *toyuu*-reduplication since we can make use of sideward movement to combine an attributive modifier with a copied noun. Perhaps, it might be possible to distinguish this type of structure from the examples in (16) since they undergo different derivation, but I leave this point for future research.

er universal quantifiers. The relevant examples are given in (20).

- (20) a. John-wa [subete-no ringo-toyuu-ringo]-o tabe-ta.  
 John-TOP all-GEN apple-TOYUU-apple-ACC eat-PST  
 ‘John ate all the apples.’  
 b. John-wa [ringo-toyuu-ringo subete]-o tabe-ta.  
 John-TOP apple-TOYUU-apple all-ACC eat-PST  
 ‘John ate all the apples.’  
 c.\*John-wa [ringo-toyuu [subete-no ringo]]-o tabe-ta.  
 John-TOP apple-TOYUU all-GEN apple-ACC eat-PST  
 ‘John ate all the apples.’

Given that the two nominals in *toyuu*-reduplication must be the same, the unacceptability of (20c) can be accounted for. Moreover, since *toyuu*-reduplication has the structure that Japanese post-nominal numeral classifiers have, the acceptability of (20a-b) also follows from the proposed analysis. Importantly, numeral classifiers also exhibit a pattern similar to (20), as shown in (21).

- (21) a. John-wa [subete-no ringo go-ko]-o tabe-ta.<sup>6</sup>  
 John-TOP all-GEN apple 5-CLS-ACC eat-PST  
 ‘John ate all the five apples.’  
 b. John-wa [ringo go-ko subete]-o tabe-ta.  
 John-TOP apple 5-CLS all-ACC eat-PST  
 ‘John ate all the five apples.’  
 c.\*John-wa [ringo subete-no go-ko]-o tabe-ta.  
 John-TOP apple all-GEN 5-CLS-ACC eat-PST  
 ‘John ate all the five apples.’

It is worth noticing here that if the maximizing effect of *toyuu*-reduplication and *subete* ‘all’ come from the same source, it is unclear why we can make use of both expressions at the same time, as in (20a-b). The proposed analysis can capture these examples. Following Brisson (2003), I assume that non-distributive universal quantifier put a restriction on the value assigned to *Cov* proposed by Schwarzschild (1996). Given this, although it appears that the maximizing effect of *subete* ‘all’ and the *toyuu*-reduplication looks alike, the ways of deriving the maximizing effect is quite different. The maximizing effect of *toyuu*-reduplication comes from the cardinality of the supremum of a set denoted by the head noun, whereas the maximizing effect of *subete* ‘all’ is related to the component of pragmatics, in which the value of *Cov* is determined.<sup>7</sup>

## 6 Conclusion

I have shown that *toyuu*-reduplication can be analyzed based on the structure of extended nominal projections proposed by Watanabe (2006, 2010) and Huang and Ochi (2014). The proposed analy-

<sup>6</sup>Huang and Ochi (2014) judge the prenominal *subete* ‘all’ with a postnominal numeral classifier as in (21a) as unacceptable, marking a sentence of this kind with “\*.” However, the sentence (21a) is acceptable when the maximal number of apples is actually five, though it sounds like non-restrictive interpretation. See Ochi (2012) for a more detailed discussion of the data.

<sup>7</sup>There are some examples which appear to show that *toyuu*-reduplication does not show the maximizing effect in some cases. When we think about examples like *kyoo-toyuu-kyoo* ‘today-TOYUU-today’ or *kondo-toyuu-kondo* ‘this.time-TOYUU-this.time’, it is difficult to come up with the cardinality of *today* or *this time*, and in fact these expressions receive interpretation like ‘this very today’ or ‘especially this time’. This kind of non-maximal interpretation is reminiscent of what the iota operator shows when it is combined with a singular noun (see Chierchia 1998). If the iota operator is combined with a plural, it denotes the largest plurality of the plural, but if the iota operator applies to a singular noun, it presupposes contextual uniqueness. Since the proposed analysis also hinges on the assumption that  $M_{SUP}$ , which picks the supremum of the denotation of its complement noun, plays a crucial role in deriving the maximizing effect, it might be possible to derive the uniqueness presupposition, just like with the iota operator. I leave the details of this kind of example of *toyuu*-reduplication for future research.

sis implies that Japanese manifests two means of lexical support for the CI head like Chinese: overt realization of the CI head or noun incorporation. The choice between these two options is not completely free; rather, it is related to the types of the CI head and items which appear in Spec,CIP.

## References

- Bale, Alan, and David Barner. 2009. The interpretation of functional heads: Using comparatives to explore the mass/count distinction. *Journal of Semantics* 26:217–252.
- Barker, Chris. 1995. *Possessive Descriptions*. Stanford, CA: CSLI Publications.
- Bošković, Željko and I-Ta Chris Hsieh. 2015. On the semantics of the NP-internal word order: Chinese vs Serbo-Croatian. In *Slavic Languages in the Perspective of Formal Grammar: Proceedings of FDSL 10.5*, ed. by Markéta Ziková, Pavel Caha, and Mojmir Dočekal, 101–120. Bern: Peter Lang.
- Brisson, Christine. 2003. Plurals, all and the nonuniformity of collective predication. *Linguistics and Philosophy* 26:129–184.
- Cheng, Lisa Lai-Shen, and Rint Sybesma. 1999. Bare and not-so-bare nouns and the structure of NP. *Linguistic Inquiry* 30:509–542.
- Cheng, Lisa Lai-Shen, and Rint Sybesma. 2012. Classifiers and DP. *Linguistic Inquiry* 43:634–650.
- Chierchia, Gennaro. 1998. Reference to kinds across languages. *Natural Language and Semantics* 6:339–405.
- Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, Massachusetts: MIT Press.
- Dowty, David. 1987. Collective predicates, distributive predicates and *all*. In *Proceedings of the 3rd Eastern States Conference on Linguistics*, ed. by Fred Marshall, Ann Miller, and Zheng-sheng Zhang, 97–115. Columbus: The Ohio State University, Department of Linguistics.
- Fukui, Naoki and Yuji Takano. 2000. Nominal structure: An extension of the symmetry principle. In *The derivation of VO and OV*, ed. Peter Svenonius, 219–254. Amsterdam: John Benjamins.
- Heim, Irena and Angelika Kratzer. 1998. *Semantics in Generative Grammar*. Oxford: Blackwell
- Huang, C.-T James and Masao Ochi. 2014. Remarks on classifiers and nominal structure in East Asian. *Peaches and Plums*:53-74.
- Kamio, Akio. 1983. Meisiku-no koozoo [The structure of noun phrases]. In *Nihongo-no kihonkoozoo [The basic structure of Japanese]*, ed. Kazuko. Inoue, 77–126. Tokyo: Sanseido.
- Kawashima, Ruriko. 1998. The structure of extended nominal phrases: the scrambling of numerals, approximate numerals, and quantifiers in Japanese. *Journal of East Asian Linguistics* 7.1:1-26.
- Kayne, Richard. 1994. *The antisymmetry of syntax*. Cambridge, Massachusetts: MIT Press.
- Kitahara, Hisatsugu. 1993. Numeral Classifier Phrases inside DP and the Specificity Effect. In *Japanese/Korean Linguistics 3*, ed. by Soonja. Choi, 171-186. Stanford: CSLI Publications.
- Kurafuji, Takeo. 2004. Plural morphemes, definiteness, and the notion of a semantic parameter. *Language and Linguistics* 5.1:211–242.
- Koizumi, Masatoshi. 2000. String vacuous overt verb raising. *Journal of East Asian Linguistics* 9:227–285.
- Larson, Richard K., and Sungeun Cho. 2003. Temporal adjectives and the structure of possessive DPs. *Natural Language and Semantics* 11:217-247.
- Longobardi, Giuseppe. 1994. Reference and proper names. *Linguistic Inquiry* 25:609–665.
- Nakanishi Kimiko. 2007. Measurement in the nominal and verbal domains. *Linguistics and Philosophy* 30:235-276.
- Nishiyama, Yuji. 2003. *Nihongomeisiku no imiron to goyooron* [Semantics and pragmatics of Japanese noun phrases]. Tokyo: Hituzi Syobo.
- Nunes, Jairo. 2001. Sideward movement. *Linguistic Inquiry* 31:303-344.
- Ochi, Masao. 2012. Universal numeric quantifiers in Japanese. *Iberia* 4:40-77.
- Schwarzschild, Roger. 1996. *Pluralities*. Dordrecht: Kluwer.
- Takano, Yuji. 2002. Surprising constituents. *Journal of East Asian Linguistics* 11:243–301.
- Tatsumi, Yuta 2014. The syntax and semantics of Japanese copular sentences. MA thesis, Osaka University.
- Watanabe, Akira. 2006. Functional projections of nominals in Japanese: Syntax of classifiers. *Natural Language and Linguistic Theory* 24:241–306.
- Watanabe, Akira. 2010. Vague quantity, numerals, and natural numbers. *Syntax* 13:37–77.