The Japanese Floating Quantifier Construction and Collectivity[1]

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I. Introduction

In this paper, I account for a collective reading of the Japanese Floating Quantifier Construction (henceforth, JFQC), modifying Kobuchi-Philip's (2003) analysis of the JFQC by adopting Winter's (2002) analysis of distributivity and collectivity together with.

With regard to the interpretation of the JFQC, the distributive reading has been paid attention to in prior research (Terada 1990, Kitagawa and Kuroda 1992, Nakanishi 2003, to appear), as shown in (1) :

(1) Otokonoko-ga   kinoo   san-nin   isu-o   tsukut-ta.
     boy-NOM   yesterday   three-CL   chair-ACC   make-PAST
     "Three boys made a chair yesterday."   ??? collective, √ distributive
                                                 (Nakanishi to appear)

The sentence in (1) allows a distributive reading under which three boys individually have the property of making a chair. However, it cannot have a reading under which a group of three boys has a property of making a chair.

Nakanishi (2003, to appear) argues that the floating quantifier in Japanese is used to measure events by measuring individuals. The measurement of events is done by measuring individuals through events via a homomorphism h (a structure-preserving function) from the lattice of events to the lattice of individuals. According to Nakanishi, this relation between events and individuals yields only a distributive reading. However, the JFQC, in fact, allows a collective reading when the matrix predicate is a collective verb, as noticed by Kobuchi-Philop (2003) and Yamashina and Tancredi (2005), as shown in (2) :

(2) Gakusei-ga   senkyo-notameni   hyaku-nin   icchidanketsushi-ta.
     student-NOM   election-for   one hundred-CL   unite-PAST
     "One hundred students united for an election."   √ collective, ??? distributive

This fact poses a problem for Nakanishi's analysis.

In this paper, I elaborate Kobuchi-Philip's (2003, 2006) analysis of the JFQC, adopting Winter's (2002) proposal for atom/set predicate distinction. Under the proposed analysis, collective predicates such as *icchidanketsusuru* "unite" or *atsumaru* "gather" denote sets of sets

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of atoms.　This collective predicate associates each element in a set with an event when it applies to an argument referring to a set.　This relation between sets and events accounts for a collectivity of the collective-predicate JFQC.

II.　Nakanishi's (2003, to appear) Analysis of the JFQC

In this section, I will discuss Nakanishi's analysis of the JFQC.　As shown in (3) and (4), measure phrases *three liters* and *go-nin* "five- CL" are used to express amount in noun phrases :

(3)　three liters of water　　　(Nakanishi 2003)

(4)　go-nin-no　　　　　gakusei
　　　five-CL-GEN　　　student

In (3), the denotation of *water* is measured by the measure phrase *three liters*, and in (4) the denotation of *gakusei* "student" is measured by the measure phrase *go-nin* "five-CL".　Following Schwarzschild (2002), Nakanishi assumes that *liter* "volume" in (3) and *-nin* "cardinality of individuals" in (4) are Direct Measure Function, since they apply directly to a set of individuals, namely, an individual *water and student*, and they give measured amounts of those individuals.

Nakanishi (2003, to appear) argues that the JFQC involves the measurement of events. To be specific, the split quantifier (i.e., floating quantifier) in the JFQC measures events denoted by the verbal predicate.　However, the measure function associated with split quantifiers agrees with the host NP.　This relation is shown by the classifier marking the host NP, as shown in (5) :
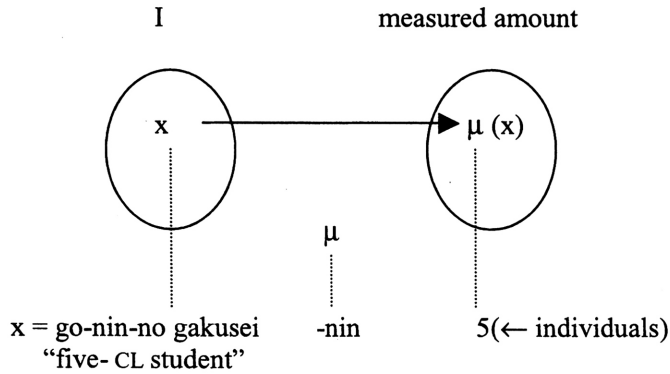
(5)　Gakusei-ga　　　　paatii-de　　　go-**nin**　　　utat-ta.
　　　student-NOM　　　party-at　　　five-CL　　　sing-PAST　　　　(Nakanishi 2003)
　　　"Five students sang at the party."

As shown in (5), the classifier *-nin* expresses the number of the students, and not the number of the singing events.
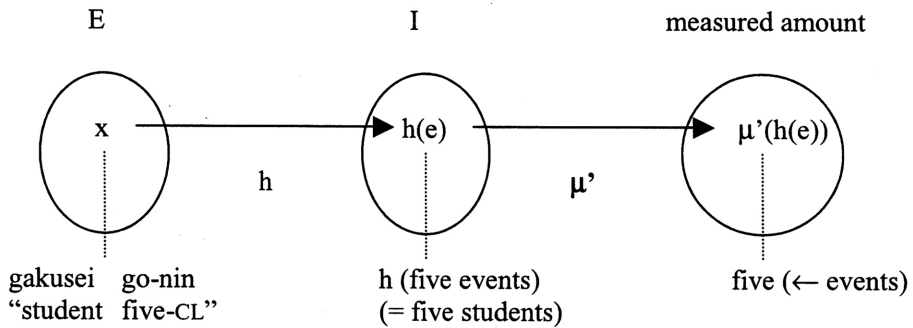
Now, as discussed above, under Nakanishi's analysis, in the JFQC, the split quantifier, namely, the floating quantifier measures events denoted by the verbal predicate.　On the other hand, the classifier of the split quantifier agrees with the host NP, and not the verbal predicate. In order to solve this mismatch, Nakanishi proposes that the measure function indirectly measures events by measuring individuals, with the help of a homomorphism from a lattice of events to a lattice of individuals.　The mechanisms of the Direct Measure Function and the Indirect Measure Function are illustrated in (6) and (7) :

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[2] In her paper (2003, to appear), Nakanishi refers to the floating quantifier construction as the split quantifier construction.
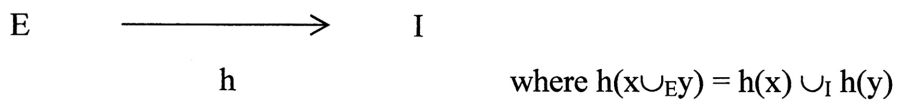
(6)　Direct Measure Functions

I　　　　　　　　　measured amount

x　→　$\mu(x)$

μ

x = go-nin-no gakusei　　-nin　　5($\leftarrow$ individuals)
"five- CL student"

(7)　Indirect Measure Functions

E　　　　　　　　I　　　　　　　measured amount

x　→　h(e)　→　$\mu'(h(e))$

h　　　　　μ'

gakusei　go-nin　　h (five events)　　　five ($\leftarrow$ events)
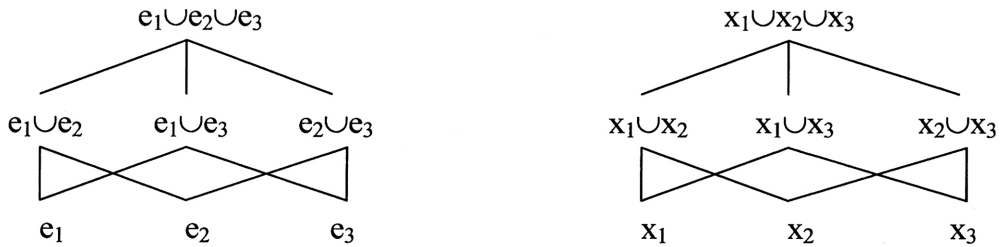"student　five-CL"　(= five students)

The Direct Measure Function in (6) measures individuals "five students" directly. On the other hand, the Indirect Measure Function in (7) indirectly measure five events by measuring five students related to those events with the help of a homomorphism from E to I.

Under this analysis, as illustrated in (8), the relation between individuals and events is based on a homomorphism h from a lattice of events E (denoted by the verbal predicate) to a lattice of individuals I (denoted by the host noun). To be specific, thematic roles of predicates such as verbs relate events to individuals. Furthermore, the thematic roles serve as homomorphism. For example, in (5), the thematic role Agent serves as h (homomorphism) from events to individuals. As shown in (9), this homomorphism preserves a lattice from E to I.

(8)

E　$\longrightarrow$　I

h　　　　　where $h(x \cup_E y) = h(x) \cup_I h(y)$

(9)

$$e_1 \cup e_2 \cup e_3 \qquad\qquad\qquad x_1 \cup x_2 \cup x_3$$

$$e_1 \cup e_2 \quad e_1 \cup e_3 \quad e_2 \cup e_3 \qquad\qquad x_1 \cup x_2 \quad x_1 \cup x_3 \quad x_2 \cup x_3$$

$$e_1 \qquad e_2 \qquad e_3 \qquad\qquad\qquad x_1 \qquad x_2 \qquad x_3$$

With the help of this homomorphism, for example, in (5), the Indirect Measure Function μ' for events can apply to $h(e)$, namely, five students related to five events by one-to-one correspondence, and it gives the measured amount of events, namely, 5. This one-to-one correspondence between events and individuals yields distributive reading of the JSQ.

III. Problem

In this section I first introduce Landman's (2000) analysis of collective predicates, since Nakanishi's (to appear) discussion of the collective predicates is crucially based on his analysis. Then, I will discuss a "collectivity" problem which Nakanishi's analysis of split quantifiers encounters.

Landman (2000) discusses distributivity and collectivity, based on the relation between thematic roles and events. According to Landman (2000), thematic roles are defined only for atomic events and take only atomic individuals, namely, singular individuals such as *John* and group atoms such as *committee*. Under this analysis, collective verbs such as *meet* are a primitive predicate which takes a group atom as its Agent argument (Landman 2000, Nakanishi 2003, to appear), as shown in (10) and (11):

(10)   The boys meet.

(11) $\exists e \in \text{MEET} : \text{Ag}(e) = \uparrow (\sigma(*\text{BOY}))$

In (11), the collective predicate *MEET* takes a group atom $\uparrow (\sigma(*BOY))$ as its Agent argument. In this semantic representation, *BOY* denotes only a set of singular individuals (a set of atoms). * is a pluralization operation. Pluralization is closed under summation, so *BOY* adds to the extension of *BOY* (namely, a set of singular individuals) all the plural sums which can be formed from the singular individuals. *The* is interpreted as σ (sigma) in his discussion. $\uparrow$ is a group-forming operation which maps a sum onto a group atom. Thus, in (11), the collective predicate *MEET* has a group $\uparrow (\sigma(*BOY))$ as its Agent argument.

Under this analysis, the distributive interpretation of example (12) is expressed as (13):

(12)   John and Mary sing.

(13) $\exists e \in {}^{*}SING : {}^{*}Ag(e) = j \cup m$

(13) means there is a sum of singing events with the sum of John and Mary as a plural agent. However, *John* and *Mary* each, are an agent of a different singular event, since thematic roles are defined only for atomic events and take only atomic individuals.

On this assumption, Nakanishi's analysis (2003, to appear) faces a problem with the collectivity exhibited by the example in (3), which is repeated as (14) for convenience :

(14) Gakusei-ga   senkyo-notameni   hyaku-nin   icchidanketsushi-ta.
      student-NOM   election-for   one hundred-CL   unite-PAST
      "One hundred students united for an election." $\sqrt{}$ collective, ??? distributive

If the collective verb takes a group atom as its argument (Landman 2000, Nakanishi 2003, to appear) as discussed above, in (14), the collective verb should take a group atom as its Agent argument and each uniting event should be related to a group atom by a homomorphism. Therefore, in (14), the split quantifier -*nin* cannot pick out any groups related to uniting events, since the classifier -*nin* must be associated with individual atoms, and not group atoms.

IV. Proposal

In this paper, I elaborate Kobuchi-Philip's (2003, 2006) analysis of the JFQC, adopting Winter's (2002) proposal for atom/set predicate distinction.

According to Kobuchi-Philip (2003, 2006), the distributive JFQC such as (15) has the semantic interpretation given in (16) :

(15) Gakusei-ga   san-nin   hashitta.
      student-NOM   3- CL   ran
      "Three students ran."   (Kobuchi-Philip 2003)

(16) $\exists y[gakusei'(y) \ \& \ \exists K[K \subseteq (\lambda u \exists v[nin'(v) \ \& \ u^{\bullet}\Pi v] \quad hashitta')] \ \& \ |K| = 3 \ \& \ \oplus K = y]$

The predicate *hashitta' "ran"* denotes a set of individuals. This kind of "distributive" predicate belongs to the category of the atom predicate under Winter's analysis, since he assumes, following Link (1983), that distributivity is yielded by the extension of a predicate only to atoms. Furthermore, the classifier -*nin* quantifies over atomic individuals as illustrated by $\lambda u \exists v[nin'(v) \ \& \ u^{\bullet}\Pi v]$ in (16). Therefore, the property *run'* must hold of each member, i.e., each individual atom of set K. This yields a distributive interpretation in the sentence in (15).

Concerning collective predicates at issue, such as *meet and gather*, they are assumed to be set predicates under Winter's (2002) analysis. Set predicates denote sets of sets of atomic entities. For example, if in a model the meetings include one meeting of Mary, John, and Sue, one joint meeting of committees A and B, and two (separate) meetings of committees B and C, the predicate *meet* denotes the following set of sets :

(17)　meet'＝{{m', j', s'}, {c'$_A$, c'$_B$}, {c'$_B$}, {c'$_C$}}

Furthermore, Winter accounts for lack of "full distributivity" shown in (18), following Landman (1989, 1996, 2000).

(18)　At the end of the press conference, the reporters asked the president questions.

（Landman 1989）

In (18), each reporter in the press conference does not have to ask a question.　Under Winter's analysis, this is because *the reporters* in (18), which is a "referential" NP, can be interpreted as a (group) atom.　The atom predicate *asked the president questions* applies to this (group) atom.

Now, according to Winter, the above analysis can extend to the difference of full distributivity between (19) and (20) :

(19)　The members of the organizing committee met. (Winter 2002)

(20)　All the members of the organizing committee met. (Winter 2002)

Both (19) and (20) have a collective verb.　The sentence in (19) does not require full distributivity of the members of the organizing committee.　This is because the definite *the members of the organizing committee* in (19) is a "referential" NP and can denote a "group" atom.　In contrast, in (20), all of the committee members have to meet, because the quantificational NP *all the members*, which is not a referential NP, cannot be mapped to a "group" atom.

The point of the discussion about (18)‐(20) is that lack of full distributivity is due to the impossibility of the mapping from a set to a (group) atom under Winter's analysis.　Thus, for example, if the set predicate *meet'* in (17) applies to the set {m', j', s'}, then the property denoted by the predicate must holds of each member of the set.

Under the assumption that the collective verb such as *icchidanketsusuru* "unite" is a set predicate discussed by Winter, I modify Kobuchi-Philip's analysis of the distributive JFQC and propose the following semantic interpretation for the collective JFQC given in (14) :

(21)　$\exists y[\text{gakusei'}(y)$ & $\exists K[K \in (\lambda v[\text{nin'}(v)] \cap \text{unite'})$ & $|K|＝100$ & $K＝y]$

In (21), the predicate *unite'* is a set predicate, which denotes a set of sets of atoms.　In other words, the set predicate *unite'* in (21) applies to a set.　The classifier in (21) quantifies over sets instead of individual atoms.　Furthermore, as shown in (21), *gakusei* in (14) denotes a property *gakusei'*.　Under Kobuchi-Philip's analysis, the Japanese noun denotes a set of objects containing both atoms and sums.　This sum corresponds to an English plural term, which we assume in this paper to be a set, following Winter (2002).　Thus, the sentence in (14) asserts that there is a set *y* which satisfies the condition *[gakusei'(y) &∃K[K ∈ (λv[nin'(v)]*

unite') & /K/=100 & K=y].

Gakusei "student" in (14) does not have a referential interpretation. This means that all the elements of a set filled in position y in (21) is associated with one uniting event. Therefore, the example in (14), which has the semantic interpretation in (21) can have a collective reading under my analysis.

V. Support for my analysis

In this section, I discuss some support for my proposed analysis.

First, Nakanishi's analysis, based on Landman (2000), assumes that the collective predicate such as *gather* and *unite* takes a group as its argument. Furthermore, a group is assumed to be an atomic individual (Barker 1992, Landman 2000). Under these assumptions, predicates such as *gather* and *unite* apply to a group, i.e., an atomic individual. Thus, Nakanishi's analysis predicts that the property denoted by the collective predicate does not have to distribute semantically to all the members of the group. However, this prediction is not borne out, as shown in (22) :

(22) # Gakusei-ga kooen-ni 20-nin atsumat-ta. sonouchi-no
   student-NOM park-in CL gather-PAST among them-GEN
   futa-ri-no gakusei-wa ko-nakat-ta.
   2-CL-GEN student-TOP come-NEG-PAST
   "Twenty students gathered in the park. Two of them did not come."

On the other hand, my proposed analysis correctly predicts the unacceptability of sentence (22). Under my analysis, the set predicate *atsumat-ta* "gathered" applies to a set and not a group atom. Therefore, all the members of the set denoted by the set predicate are involved with the event denoted by the set predicate such as *meet* or *unite*, as discussed in section VI. We cannot have a situation in which twenty students gathered in the park, but two of the students did not come to the park where the twenty students gathered.

Second, the collective verb such as *meet* and *unite* can also take a group atom as well as an individual atom as shown in (23) :

(23) sono-iinkai-ga icchidanketsushi-ta.
   the-committee-NOM unite-PAST
   "The committee united."

Furthermore, we have a classifier to count group atoms, i.e., *-kumi* in Japanese in addition to the classifier to count individuals, i.e., *-nin*, as discussed in Kobuchi-Philip (2003, 2006). So, my proposed analysis predicts that, if the classifier *-kumi* replaces the classifier *-nin* in (14), we can have a collective-predicate JFQC in which groups united. This prediction is borne out as shown in (24) :

(24)　Gakusei-ga　　　senkyo-notameni　　san-kumi　　icchidanketsushi-ta.
　　　student-NOM　　election-for　　　　three-CL　　unite-PAST
　　　"Three groups of students united for an election."

On the other hand, Nakanishi's analysis (2003, to appear) incorrectly predicts that the collective-predicate JFQC such as (24) has a distributive reading, but not a collective reading. Under Nakanishi's analysis, each uniting event should be related to a group atom by a homomorphism, since thematic roles are defined only for atomic events and collective verbs take a group atom as its Agent argument (Landman 2000, Nakanishi 2003, to appear). This analysis predicts that in (24) there are three uniting events and that in each event a group of students united. However, under this analysis, one uniting event cannot be related to three different groups of students. If we try to have a mapping from one event to three different groups, still assuming that collective verbs take a group atom as its argument, then an atomic uniting event is mapped to atomic individuals and all the sums of those atomic individuals. However, there is no homomorphism in this relation between uniting events and individuals, i. e., "students". This mapping from an event to individuals cannot be a function, since it is a one-to-many correspondence between events and individuals.

VI.　Wh-mo expressions

My proposed analysis of the collectivity of the JFQC is also consistent with Yamashina and Tancredi's (2005) analysis of wh-*mo* constructions in Japanese. As discussed by Yamashina and Tancredi (2005), wh-*mo* expressions in Japanese cannot have a group interpretation as shown in (25) and (26) :

(25)　# Nani-o　　　yatte-ita　　　gakusei-mo　　tenjo-ni　　　　sawat-ta.
　　　what-ACC　　doing-were　　student-mo　　ceiling-DAT　　touch-PAST
　　　"The students who had been doing whatever touched the ceiling."
　　　　　　　　　　　　　　　　　　　　　　　(Yamashina and Tancredi 2005)

(26)　Gakusei-tachi-ga　　tenjo-ni　　　　sawat-ta.
　　　student-PL-NOM　　ceiling-DAT　　touch-PAST
　　　"The students touched the ceiling." (Yamashina and Tancredi 2005)

The sentence in (25) is unacceptable in the situation in which a group of students as a whole touches the ceiling, for example, by making a human pyramid. In (25), every student has to touch the ceiling. Under Yamashina and Tancredi's analysis, the subject thematic role needs to apply to a group in order for a subject NP to obtain a group interpretation. However, they analyze wh-*mo* expressions as i-sums. Therefore, the wh-*mo* expression in (25) cannot have a group interpretation.

Given that the collective verb such as *gather* and *unite* needs to apply to a group atom as discussed by Landman (2000), it is incorrectly predicated that the collective verb cannot take

wh-*mo* expression as its subject argument. However, in fact, the collective verb can take a wh-*mo* expression as its subject argument, as shown in (27) and (28) :

(27)　Nani-o　　　hii-ta　　　　sorisuto-tachi-mo　　atsumat-ta
　　　what-ACC　play-PAST　soloist-PL-MO　　　gather-PAST
　　　"Soloists who played whatever gathered."(Yamashina and Tancredi 2005)

(28)　Nani-o　　　yatte-ita　　gakusei-mo　　icchidanketsushi-ta.
　　　what-ACC　doing-were　student-mo　　unite-PAST
　　　"The students who had been doing whatever united."

These examples show that the collective verb such as *atsumatta* "gathered" and *icchidanketsushita* "united" is a predicate which can apply to a non-group atom.

　　My analysis does not face a problem with the examples in (27) and (28). Under Yamashina and Tancredi's (2005) analysis, wh-*mo* expressions denote i-sums, which are interpreted as a plural. Under Winter's (2002) analysis, which is adopted by my analysis, the i-sum corresponds to a set, since he assumes that, in the plural, atom predicates are mapped to sets of sets of atoms. Thus, in (27) and (28), the set predicates *atsumatta* "gather" and *icchidanketsushita* "united" can apply to wh-*mo* expressions, namely, sets.

VII.　Conclusion

　　In this paper, I have discussed the collective reading of the Japanese Floating Quantifier Construction (JFQC). It is generally assumed in previous literature (Terada 1990, Kitagawa and Kuroda 1992, Nakanishi 2002, to appear) that the JFQC exhibits a distributive reading and does not allow a collective reading of the JFQC. However, the JFQC, in fact, allows a collective reading when the matrix predicate is a collective verb, as noticed by Kobuchi-Philip (2003) and Yamashina and Tancredi (2005).

　　There are two recent researches which tackle the issue of the absence of a collectivity reading from a semantic perspective, Nakanishi (2003, to appear) and Kobuchi-Philop (2003). Nakanishi (2003, to appear) argues that the floating quantifier in Japanese measures events by measuring individuals through events via a homomorphism h (a structure-preserving function) from the lattice of events to the lattice of individuals. According to Nakanishi, this relation between events and individuals yields only a distributive reading.

　　The JFQC, however, allows a collective reading when the matrix predicate is a collective verb (Kobuchi-Philop 2003 and Tancredi 2005). Under Nakanishi's analysis, the collective verb takes a group atom as its argument. Therefore, even if the classifier to count individual atoms, i.e., -*nin* is used in the collective JFQC, it cannot count group atoms. Furthermore, the replacement of the classifier -*nin* with the classifier to count groups, i.e. -*kumi* does not improve the situation. Even in this situation, the collective JFQC cannot obtain a collective reading such as a reading in which a group of the groups united or gathered.

　　In this paper, I have elaborated Kobuchi-Philip's (2003, 2006) analysis of the JFQC,

adopting Winter's (2002) proposal for atom/set predicate distinction. Under this analysis, the collective predicate is analyzed as a set predicate. The set predicate applies to a set and associates one event described by the predicate with all the elements of the set. This relation between events and sets yields a collective interpretation of the JFQC. Under this analysis, the number marked by the classifier, i.e., the floating quantifier, shows the cardinality of sets, i.e., the number of the elements in a set.

Some support for my proposed analysis has come from the following two facts: (1) the argument to which the set predicate applies lacks a group property and (2) the collective predicate JFQC can have a collective interpretation of groups.

Finally, my analysis of the JFQC is consistent with Yamashina and Tancredi's (2005) analysis about wh-*mo* expressions in Japanese. According to Yamashina and Tancredi, wh-*mo* expressions in Japanese cannot have a group interpretation. However, in fact, the collective verb which exhibits a collective reading in the Japanese JFQC can take a wh-*mo* expression as its subject NP. This shows that the collective verb does not always have to take a group atom as its argument.

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