What Nakanishi (2003, 2006) and Kobuchi-Philip (2003) have left behind concerning the Japanese Floating Quantifier Construction[1]

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1. Introduction

In this paper, I discuss a collective reading of the Japanese Floating Quantifier Construction (henceforth, JFQC). It has been argued that the JFQC allows a distributive reading, but not a collective reading (Terada 1990, Kitagawa and Kuroda 1992, Nakanishi 2003, 2006), 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) can have a distributive reading under which three boys individually have the property of making a chair, but it cannot have a collective reading under which a group of three boys has a property of making a chair.

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), 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

In this paper, I propose that, adapting Nakanishi (2003) and Kobuchi-Philip (2003), the domain of objects in the collective JFQC is non-atomic and atomic individuals cannot be mapped to atomic events by a thematic role. In the collective JFQC, sums of individuals are mapped to a singular event. This correspondence yields a collective reading.

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2. Prior research

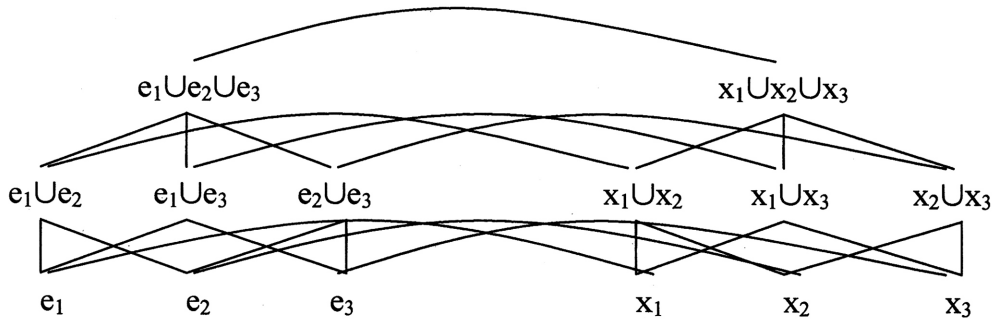
In this section, I discuss how Nakanishi's analysis (2003, 2006) and Kobuchi-Philip's analysis (2003) each try to deal with this "collective reading" problem.

2.1. Nakanishi (2003, 2006)

Nakanishi (2003, 2006) argues that the floating quantifier in Japanese measures events by measuring individuals through events via a homomorphism *h* from the lattice of events to the lattice of individuals. This analysis predicts that a collective reading is not allowed in the JFQC because of a homomorphism between events and individuals.

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. Under this analysis, as illustrated in (3), the domains of individuals and events each have the following structure :

(3)



The events and individuals at the bottom in (3) are singularities. ∪ is a sum operator. Take, for example, $e_1 \cup e_2$ and $x_1 \cup x_2$. $e_1 \cup e_2$ is the plurality constituted by e_1 and e_2. $x_1 \cup x_2$ is the plurality of x_1 and x_2. The lines indicate the part-of (or component-of) relation $\leq$. Thus, for example, we have the following part-of relation between $\{e_1 \cup e_2\}$ and $\{e_1 \cup e_2 \cup e_3\}$ given in (4) :

(4) $\{e_1 \cup e_2\} \leq \{e_1 \cup e_2 \cup e_3\}$

Furthermore, Nakanishi argues that there is 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), where $h(x \cup_E y) = h(x) \cup_I h(y)$. The thematic roles serve as homomorphism. For example, in (1), the thematic role Agent serves as *h* (homomorphism) from events to individuals. This homomorphism preserves a lattice from E to I, as shown in (3).

The measure function picks up a sum of individuals whose cardinality is three, i.e. $x_1 \cup x_2 \cup x_3$ in the domain of I and indirectly measures events by measuring those individuals, with the help of a homomorphism from a lattice of events to a lattice of individuals.

Under this analysis, because of the homomorphism between events and individuals, each individual, namely, x_1, x_2, x_3 is the agent of events, e_1, e_2, e_3, respectively. This one-to-one

correspondence between events and individuals yields a distributive reading of the JSQ.

The above Nakanishi's analysis does not allow a collective reading of the JFQC. Nakanishi (2006) tries to account for "collective-reading"-like phenomena based on incrementality. She notices the collective reading of the JFQC only with respect to a plural internal argument (but not a plural external argument), as shown in (5) :

(5) John-ga hako-o heya-ni juk-ko tumikasane-ta.
NOM box-ACC room-in ten-CL pile up-PAST
"John piled up ten boxes in the room."

According to Nakanishi, there is an inherent incremental relationship between an event and its internal argument in (5). To be explicit, as the piling up event proceeds, the number of boxes increases. Thus, a "collective-reading"-like phenomenon in (5) does not show a collective reading, but rather shows a distributive reading.

However, this analysis faces a problem. Incrementality does not hold in the verb *unite* in (1) and the verb *pile up* in (2). According to Krifka (1998), the following property in (6) needs to hold in the incremental relation :

(6) θ shows *mapping to subobjects* iff
$\forall x, y \in U_P \forall e \in U_E[\theta(x, e) \wedge y <_P x \rightarrow \exists e'[e' <_E e \wedge \theta(y, e')]]$

(6) means that, when θ holds for an object x and an event e, and y is a part of x, then y stands in the relation θ to a part e' of e. However, concerning (2) and (5), in the cases in which "two students unite" or "John piled up two boxes", there are no proper parts of those events which have single individuals as its agent or theme.

2.2. Kobuchi-Philip (2003, 2006)

Kobuchi-Philip (2003, 2006) argues that the collective JFQC and the distributive JFQC are of different types. According to her, the distributive JFQC such as (7) has the semantic interpretation given in (8) :

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

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

The predicate *hashitta' "ran"* denotes a set of individuals. Furthermore, the classifier *-nin* quantifies over atomic individuals as illustrated by $\lambda u \exists v[\text{nin}'(v) \& u^{\bullet} \Pi v]$ in (8). Therefore, the intersection of the sets denoted by *ran* and by *-nin* consists of atomic individuals which have the property *ran'*. Thus, the property *ran'* must hold of each member, i.e., each individual atom of set K. This yields a distributive interpretation in the sentence in (7).

Concerning the collective JFQC, Kobuchi-Philip claims that the FQ indicates the amount of an entity associated with the FQ, like the amount of a mass entity measured out in the *-ml* or *-ton* scale. For example, in (2), the amount of the relevant set of students, taken as a single entity, can be measured out as 100 in the 'nin' scale. According to Kobuchi-Philip, the licensing condition for this type of JFQC is the presence of range of amount. In other words, the collective JFQC is not allowed if the FQ cannot be another amount in a different situation. This is illustrated in (9) :

(9) *Suiso-genshi-ga kono-ondo-de, futa-tsu hito-tsu-no
hydrogen-atom-NOM this-temperature-at 2-CL 1-CL-GEN
suiso-bunshi-o tsukuru.
hydrogen-molecule-ACC form
"Two hydrogen atoms form a hydrogen molecule at this temperature."

In (9), the number construed with a hydrogen atom, i.e., 2 is an invariant number. There are no other possibilities under normal circumstances. Therefore, the sentence in (9) is unacceptable, according to Kobuchi-Philip.

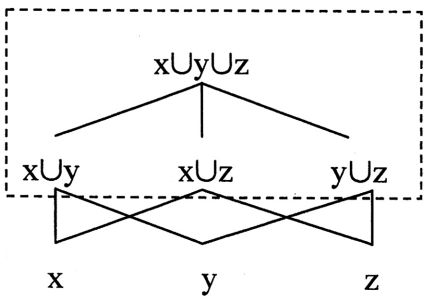
However, one problem is that, under this analysis, the licensing condition is just a stipulation and does not come from any principle or property.

3. Proposal

In this paper, adapting Kobuchi-Philip (2003) and Nakanishi (2003), I propose that the FQ in the JFQC measures the amount of an event if the domain of objects is non-atomic like mass-nouns and plurals, whereas, following Nakanishi (2003), the FQ measures the number of events by measuring individuals if the domain of objects is atomic.

In the collective JFQC, the domain of objects is like that of plurals, i.e., all the sums of atomic individuals minus all the atoms (Chierchia 1998). To be specific, in the case of the collective predicate, the domain of objects is the set of the non-atomic elements in a join semi-lattice of individuals, like the domain of plurals, as illustrated in (10).

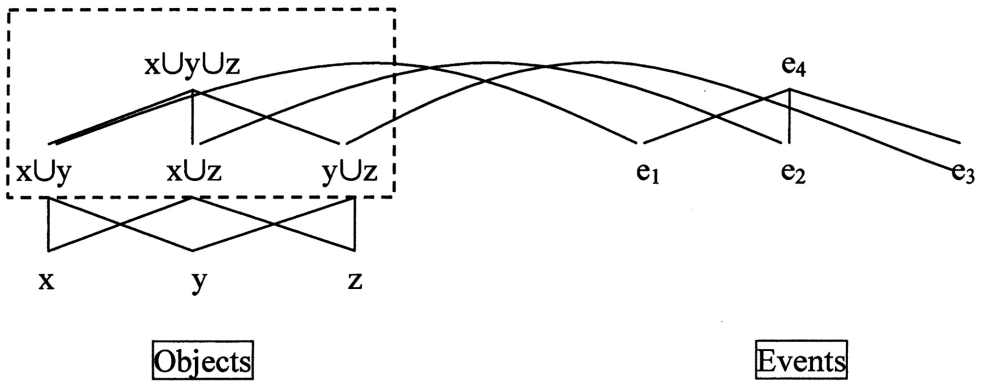
(10)



In (10), x, y, and z are singular individuals, i.e., atoms. ∪ indicates sum (or join) operator. The lines indicate the part-of relation ≤.

Furthermore, there is a homomorphism from objects to events such that $h(x)\oplus h(y) = h(x \cup y)$ (Krifka 1989). In the case of the collective JFQC, minimal elements, $x \cup y$, $x \cup z$, $y \cup z$ in the object domain are mapped to singular events, e.g., e_1, e_2, and e_3.

(11)

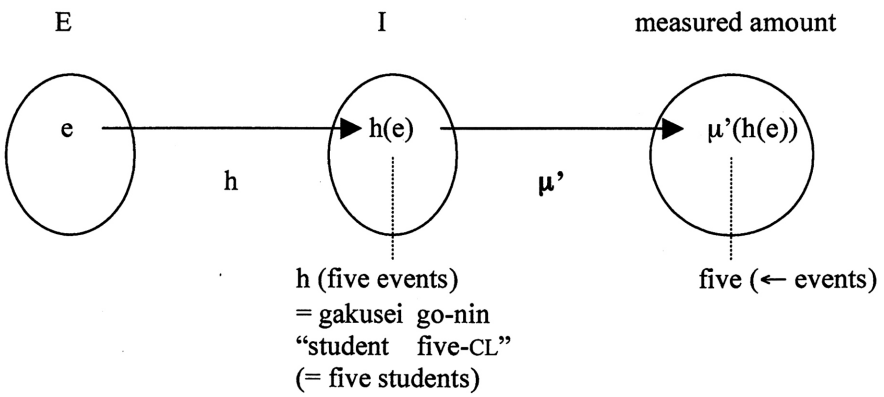


Furthermore, $h(x \cup y)\oplus h(y \cup z) = h(x \cup y)\oplus h(x \cup z) = h(x \cup z)\oplus h(y \cup z) = h(x \cup y \cup z)$. Thus, $e_1\oplus e_2 = e_1\oplus e_3 = e_2\oplus e_3$. $e_1\oplus e_2$, $e_1\oplus e_3$, and $e_2\oplus e_3$ are each a singular event. In this analysis, events are considered the same if they have the same individuals as their agents.

3.1. Measure function

In my analysis of the collective JFQC, adapting Nakanishi (2003), the measure function μ (*-nin*) indirectly measures the amount of an event in the 'nin scale', as illustrated in (12).

(12) Indirect Measure Functions



(13) Gakusei-ga paatti-de go-nin ut-ta.
boy-NOM party-at five-CL sing-PAST
"Five students sang." ??? collective, √ distributive

(Nakanishi to appear)

Under Nakanishi's analysis, the events in (13) are measured as follows. With the help of a

homomorphism from a lattice of events to a lattice of individuals, in (13), 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 also yields a distributive reading of the JSQ.

Under Nakanishi's analysis, there is a homomorphism from a lattice of events to a lattice of individuals. However, she does not assume a homomorphism from a lattice of individuals to a lattice of events, contra Krifka (1989, 1992). In my analysis, I adopt Krifka's idea and assume that there is a homomorphism from a lattice of individuals to a lattice of events. Furthermore, following Nakanishi (2003), I also assume a homomorphism from a lattice of events to a lattice of individuals. In other words, the inverse relation of the homomorphism (i.e., function) from individuals to events must also be a homomorphism. Thus, under my analysis, the measure function μ(*-nin*) indirectly measures the amount of an event in the'nin scale' with the help of the homomorphism.

4. Arguments for my analysis

4.1. Collectivity

This section shows that my analysis does not have any problem with a collective reading of the JFQC in (2). Under my analysis, the Agent role of the collective predicate maps a sum of individuals to a singular event. This means that a sum of individuals can be the Agent of a singular event. This accounts for a collective reading of the JFQC in (2).

Concerning the distributive JFQC, atomic individuals are mapped to atomic events. A sum of atomic events are indirectly measured based on a homomorphism between events and individuals, i.e., a one-to-one correspondence between events and individuals. Thus, the distributive JFQC has a distributive reading, as discussed by Nakanishi (2006).

Under her analysis, Nakanishi (2006) assumes that basic predicates never take sums in their extension, following Landman (2000). In other words, a thematic role serving as a homomorphism never maps an atomic event to a sum of individuals.. Contra Nakanishi, following Winter (2002), I assume that collective verbs take sets (or sums) in their extensions.

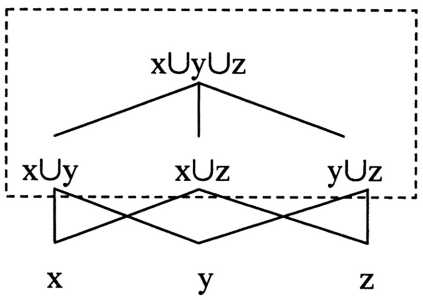
4.2. Kobuchi-Philip's (2003) licensing condition of the collective JFQC

As I discussed in section 3.2., concerning the collective JFQC, Kobuchi-Philip (2003) claims that the FQ in the collective JFQC indicates the amount of an entity associated with the FQ, like the amount of a mass entity measured out in the *-ml* or *-ton* scale. I agree with her insight concerning the collective JFQC. However, under her analysis, the licensing condition for this type of JFQC is the presence of range of amount. In other words, the collective JFQC is not allowed if the FQ cannot be another amount in a different situation, as discussed in section 2.2. However, this licensing condition is just a stipulation and does not come from any principle or property.

Under my analysis, cumulativity must hold in the domain of objects in the collective JFQC. As discussed in section 3, the domain of objects is the set of the non-atomic elements in a join

semi-lattice of individuals, like the domain of plurals, as illustrated in (14) :

(14)



Even though the singular objects x, y, and z are not in the domain of objects, cumulativity, which is defined in (15) (Krifka 1989), holds in the structure in (14), like the domain of plurals (Link 1983).

(15) $\forall P[CUM(P) \leftrightarrow \forall x, y[P(x) \wedge P(y) \rightarrow P(x \quad y)]]$

Kobuchi-Philip's licensing condition for the collective JFQC is derived from this property in my analysis.

4.3. A distributive reading of the JFQC with a collective verb

My analysis predicts that the JFQC with a collective verb can also have a distributive reading if the domain of objects is atomic. In other words, if a collective verb can have atomic group individuals in its extension and a thematic role maps atomic groups to atomic events, the JFQC can have a distributive reading. This is borne out, as shown in (16) and (17) :

(16) Hito-kumi-no gakusei-ga icchidanketsushi-ta.
one-CL-GEN student-NOM unite-PAST
"A group of students united."

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

The verb *icchidanketsus* "unite" can have a group atom in its extension as shown in (16). Therefore, the JFQC with a collective verb can have a distributive reading as shown in (17). The sentence in (17) can have an interpretation in which three different groups of students unite separately.

5. Another issue

Under my analysis, the JFQC cannot have a distributive reading if the domain of objects

is non-atomic and atomic individuals cannot be mapped to atomic events by a thematic role. In the collective JFQC, sums of individuals are mapped to a singular event. This correspondence yields a collective reading. Then, a question naturally arises as to why mixed predicates (e.g., *happyou-suru* "make a presentation"), which can be a distributive or collective predicate, have only a distributive reading in the JFQC, as shown in (18), even though the predicates can have a collective reading as shown in (19) :

(18) Gakusei-ga zemi-de san-nin happyou-shi-ta.
student-NOM seminar-in 3-CL presentation-do-PAST
"Three students made a presentation in the seminar." ??? collective, √ distributive

(19) San-nin-no gakusei-ga kino happyou-shi-ta.
three-CL-GEN student-NOM yesterday presentation-do-PAST
"Three students made a presentation yesterday." √ collective, √ distributive

Following Kobuchi-Philip (2003), I assume that the classifier must denote a set of only atomic individuals because, according to a basic principle of the logic of counting, an entity must be discrete in order to be countable (Kratzer 1989, Chierchia 1998a, Landman 2000). Thus, the classifier must count the number of atomic individuals. Given that, under my analysis, a collective reading is not allowed in the mixed-predicate JFQC because a mixed predicate can have atomic individuals as its extension and, thus, can map atomic individuals to atomic atoms. Therefore, the classifier can and must indirectly measure events by counting atomic individuals.

On the other hand, in the case of the collective JFQC, the collective predicate does not have atomic individuals as its extension, since the domain of objects is non-atomic like mass-nouns and plurals. Furthermore, the collective predicate does not map atomic individuals to atomic events. Therefore, the classifier cannot indirectly measure events by counting atomic individuals.

In the collective JFQC, we have a relation given in (11) between individuals and events. Though the classifier cannot count the number of atomic individuals, it can serve as a measure function, since the FQ in the collective JFQC also meets the following condition, which is argued for by Nakanishi (2003) :

(20) Monotonicity Constraints on the Verbal Domain
a. The Constraint on the Verbal Domain
The verbal predicate must have a part-whole structure, i.e., the extension of the verbal predicate must be a lattice of events.
b. The Constraint on Measure Functions
The measure function μ must be monotonic relative to the given part-whole structure, i.e., a lattice of events.

In the case of the collective predicate such as *icchidanketsus* "unite", for example, if five students unite, then three students among them must also unite. Thus, the FQ in the collective JFQC meets the Constraint on the Verbal Domain. Furthermore, concerning the Constraint on Measure Functions, the FQ must meet the following constraint in (21) on Indirect Measure Functions.

(21) The indirect measure function μ' is monotonic relative to the domain E iff :
For events e_a, e_b in E :
If $h(e_a)$ is a proper subpart of $h(e_b)$, then $\mu'(h(e_a)) < \mu'(h(e_b))$, where h is a homomorphism from E to I such that $h(e_1 \cup_E e_2) = h(e_1) \cup_E h(e_2)$

This constraint is also met in the collective JFQC, since, if $h(e_a)$ is a proper subpart of $h(e_b)$, then '-nin' $(h(e_a))$ is a proper subpart of '-nin' $(h(e_b))$ as well. Therefore, I argue that the FQ can be a measure function in Schwarzschild's (2002) sense and that it can measure out the amount of an event in a certain scale, e.g., the '-nin' scale in (2).

6. Conclusion

In this paper, I discussed a collective reading of the Japanese Floating Quantifier Construction (henceforth, JFQC). Prior research on the JFQC, such as Nakanishi (2003, 2006) and Kobuchi-Philip (2003), faces a problem with a collective reading of the JFQC. In order to account for the collective reading, Nakanishi (2003, 2006) resorts to an inherent incremental relationship between an event and its internal argument. However, incrementality does not hold in the collective JFQC, as discussed in section 2.1. Kobuchi-Philip (2003) proposes a licensing condition on a collective reading of JFQC. However, this licensing condition is just a stipulation and does not come from any principle or property, as discussed in section 2.2.

In this paper, I argued that the domain of objects in the collective JFQC is like that of plurals, i.e., all the sums of atomic individuals minus all the atoms (Chierchia 1998). Furthermore, all the sums of individuals are mapped to singular events. This relation between individuals and events accounts for a collective reading of the JFQC.

Under my analysis, cumulativity must hold in the domain of objects in the collective JFQC. However, cumulativity does not have to be downwardly closed. Thus, my analysis does not face a problem which Nakanishi (2003, 2006) does. Furthomore, under my analysis, Kobuchi-Philip's licensing condition for the collective JFQC is not just a stipulation and is derived from cumulativity.

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