A Non-Floating Analysis of "Floating" Quantifiers in Japanese ¹
The First Approximation

Kaz Fukushima
University of Arizona

0 Introduction

This paper provides a new approach to an old problem that has been discussed in the literature of Japanese linguistics under the rubric of 'floating quantifiers' (see Haig 1980 for the classical TG accounts). The relevant phenomena are exemplified in (1) and (2). (The items that 'go together' are underlined.)

(1)

a. San-nin onna-ga hon-o sensei-ni okut-ta
   three-person woman-nom book-acc teacher-dat send-past
   'Three women sent a book to the teacher'
b. Onna-ga san-nin hon-o sensei-ni okut-ta
c. *Onna-ga hon-o san-nin sensei-ni okut-ta
d. *Onna-ga hon-o sensei-ni san-nin okut-ta

(2)

a. San-satu onna-ga hon-o sensei-ni okut-ta
   three-booklet woman-nom book-acc teacher-dat send-past
   'The woman sent three books to the teacher'
b. Onna-ga san-satu hon-o sensei-ni okut-ta
c. Onna-ga hon-o san-satu sensei-ni okut-ta
d. Onna-ga hon-o sensei-ni san-satu okut-ta

What we see in (1) and (2) are distinct construal patterns between the 'floated quantifiers' and their construees, namely the subject onna-ga in (1) and the direct object hon-o in (2). In (2) the quantifier san-satu is able to 'float around' to any pre-verbal position unlike its counterpart san-nin in (1).

The core proposal of the present study is that the relevant phenomena are plausibly explained by abandoning a 'floating' analysis and adopting the present non-floating account. ² The theory outlined here is loosely based on unification based grammatical theories, represented by Generalized Phrase Structure Grammar (Gazdar, Klein, Pullum, and Sag (GKPS) 1985), Head-driven Phrase Structure Grammar (Pollard and Sag (P&S) 1987), Japanese Phrase Structure Grammar (Gunji 1987), and Unification Categorial Grammar (Zeevat 1988). Given the non-trivial ordering possibilities among the non-verbal elements seen in (1) and (2), it is of theoretical

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² The opposition to the classical transformational accounts is not original to the present paper: see Inoue (1978), Kitagawa (1980), and Takano (1984, 1986). Among these Takano (1984) points out the inadequacy of the transformational accounts and suggests a lexical approach in an informal manner. The present paper is an attempt to give Takano's suggestion an explicit form.
interest, hence one of the important issues pursued by the present study, that a unification based grammar which assumes no transformations is indeed capable of explaining the long distance dependency involving ‘floated quantifiers' for which, traditionally, a transformational account was considered to be the only possibility. The goal of this paper is accomplished in the following manner.

Section 1 is dedicated to the description of the relevant phenomena and establishes the range of data for which a theory of ‘floated’ quantifiers (more accurately called numeral classifiers or simply classifiers in the text) has to offer an explanation. Based on the distributional patterns established in Section 1, Section 2 outlines the present syntactic treatment of the quantifiers. The distinct and appropriate lexical entries which reflect proper syntactic and semantic types are established for different classes of quantifiers. Also entertained there is the non-transformational solution for the problem of ‘dislocated’ quantifiers as well as the complication that arises from the co-existence of the ‘dislocated’ quantifiers and so called ‘scrambling’ phenomena. The solution employs a GPSG apparatus, namely a SLASH Feature (GKPS 1985), motivated (and widely adopted by its close relatives) for long distance dependency phenomena. From a Model Theoretic (Montague 1974, Dowty, Wall, and Peters 1981) point of view, Section 3 focuses on semantics of quantifiers and gives an explicit form to an informal but very important assumption introduced in Section 2: the fact that the distribution of quantifiers is to be accounted for not just by syntactic conditions but rather by the interaction of syntactic and semantic conditions. Specifically, this paper suggests that the quantifier under discussion is semantically not a determiner (in the sense of Barwise and Cooper 1981) that is directly construed with a common noun but rather a functor that relates V-projection denotations to common noun denotations in a fashion similar to the proposal of Dowty and Brodie (1984). After the presentation of the new approach, Section 4 briefly reviews a recent

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3 Quantifiers are called (numeral) classifiers in the text, this is because they not only serve as quantificational (i.e. numeral) devices but also restrict the class of common nouns with which they are construed: (ib) is semantically ill-formed for there is a mismatch between the classifier and the common noun.

(i) a. Otoko-ga san-nin ki-ta
   man -nom three-person come-past
   ‘Three men came'

b. #Otoko-ga san-biki ki-ta
   man -nom three-animal come-past
   ‘(Int.)Three men came'

4 The differences between the classifiers discussed in the present paper and ‘VP-quantifiers’ in English (e.g. all, each) in Dowty and Brodie (1984) is as follows. In the latter case the quantifiers relate VP-denotations and NP-denotations, while in the former case the VP-denotations are related to CN-denotations by the classifiers. It seems to be the case that, in Japanese, it is possible to have two of these in a single sentence, e.g. (i) and (ii).

(i) Onna-ga san-nin zenbu ki-ta
   woman-nom three-person all come-past
   ‘The three women all came'

(ii) Onna-ga san-nin sorezore ki-ta
    woman-nom three-person each come-past
    ‘The three women each came'
Government Binding (Chomsky 1981) treatment of 'floated quantifiers' proposed by Miyagawa (1987, 1988) and compares it to the present account.

1.0 Distributions of Japanese numeral classifiers

In this section let us survey the distributions of (numeral) classifiers. The set of data given here is similar to that accumulated in the literature on Japanese classifiers (Kamio 1977, Shibatani 1977, 1978, Kuno 1978, Haig 1980, Takano 1984, 1986, Miyagawa 1987, 1988). For ease of exposition, I will divide up the classifier distributions into four different classes based on their construal patterns with subjects, direct objects, indirect objects, and other optional adjuncts (in the sense of P&S 1987). Also I ignore the word order variation in the language for the moment but will come back to this in Section 2.5 below.

Generally, the following three patterns emerge through the examination of the data below. First the construal of a classifier to a subject is possible provided the construal does not cross over an indirect object or a direct object when a subject precedes these two. Second, a direct object is accessible by a classifier from any pre-verb position in a given sentence. Third, the construal of a classifier to an indirect object or an adjunct is not possible from any position external to the indirect object phrase or the adjunct phrase.

1.1 Construal to subjects

Let us begin with cases involving subject P[ostpositional] P[hrase]s and classifiers. Except for a few cases, construal of classifiers to subject constituents is relatively free from various positions in a given sentence. Consider sentences in (3). In these examples hikoozyoo-kara and Tookyoo-e are optional.

(3) Intransitive V with source and goal adjuncts

a. Hikooki yonki-ga hikoozyoo-kara Tookyoo-e tobitat-ta
   airplane four-cl-nom airport-from Tokyo-to take-off-past
   'The four airplanes took off from the airport for Tokyo'
b. Yonki Hikooki-ga hikoozyoo-kara Tookyoo-e tobitat-ta
   c. Hikooki-ga yonki hikoozyoo-kara Tookyoo-e tobitat-ta
   d. Hikooki-ga hikoozyoo-kara yonki Tookyoo-e tobitat-ta
   e. Hikooki-ga hikoozyoo-kara Tookyoo-e yonki tobitat-ta

Also classifiers do not require nominals that are principle filters (i.e. families of sets having a non-empty intersection) as VP-quantifiers in Dowty and Brodie do. Only classifiers are going to be discussed in the text and the VP-quantifiers, zenbu and sorezore, in (i) and (ii) are ignored.

The terms 'subject', 'object', etc. here and 'goal', 'path', etc. below are used for descriptive convenience only and do not have any theoretical significance for the syntactic and semantic analyses given in the text.

A PP is a sequence consisting of a common noun (with or without modifiers)/proper noun and a postposition of which the postposition is the Head, e.g. (i).

(i) a. onna-ga    b. Taroo-o    c. sensei-ni    d. gakkoo-kara
    woman-nom       -acc     teacher-dat     school-from
Although I do consider a bare classifier such as *yonki* and a classifier with a postposition such as *yonki-ga* in (3) to be distinct objects, for now I treat them as classifiers in general for ease of exposition (see the syntactic analysis in Section 2.1 below). The sentences in (3) contain adjuncts and what we see is free interweaving of the classifier *yonki*, the subject *hikooki-ga*, the source adjunct *hikoozvoo-kara*, and the goal adjunct *Tookvyoo-e*. The same construal patterns obtain with any other adjuncts.

But when we have SUBCATategorized complements (inclusive of subjects, see P&S 1987) such as the direct object *tegami-o* and the indirect object *sensei-ni* in (4), the construal pattern is more restricted in that the classifier *yonken* cannot be construed back to the subject *svuppansva-ga* crossing over neither the direct object nor the indirect object. This observation is found in Haig (1980).

(4) Ditransitive V with DO and IDO complements

a. *Syuppansya yonken-ga tegami-o sensei-ni okut-ta*
   publisher four-cl-nom letter-acc teacher-dat send-past
   ‘The four publishers sent the letter to the teacher’

b. *Yonken syuppansya-ga tegami-o sensei-ni okut-ta*

c. *Syuppansya-ga yonken tegami-o sensei-ni okut-ta*

d. *Syuppansya-ga tegami-o yonken sensei-ni okut-ta*

e. *Syuppansya-ga tegami-o sensei-ni yonken okut-ta*

1.2 Construal to direct objects

The cases with direct objects show a different distributional pattern of classifiers from those with subjects. The data in (5) form a sharp contrast with those in (4).

(5) Ditransitive V with DO and IDO complements

a. *Syuppansya-ga tegami gotuu-o sensei-ni okut-ta*
   publisher-nom letter five-cl-acc teacher-to send-past
   ‘The publisher sent five letters to the teacher’

b. *Gotuu syuppansya-ga tegami-o sensei-ni okut-ta*

c. *Syuppansya-ga gotuu tegami-o sensei-ni okut-ta*

d. *Syuppansya-ga tegami-o gotuu sensei-ni okut-ta*

e. *Syuppansya-ga tegami-o sensei-ni gotuu okut-ta*

As can be noticed easily, from any pre-verbal position in the sentence the construal of classifier *gotuu* and the direct object *tegami-o* is possible. Introducing an optional locative adjunct does not change the construal pattern between a direct object and a classifier at all.

(6) Transitive V with DO and a locative adjunct

a. *Gakusei-ga honya-de hon sansatu-o kat-ta*
   student-nom bookstore-at book three-cl-acc buy-past
   ‘The student bought three books at the book store’

b. *Sansatu gakusei-ga honya-de hon-o kat-ta*

c. *Gakusei-ga sansatu honya-de hon-o kat-ta*

d. *Gakusei-ga honya-de sansatu hon-o kat-ta*

e. *Gakusei-ga honya-de hon-o sansatu kat-ta*
In (6) there is an adjunct honya-de in between the subject gakusei-ga and the direct object hon-o but this does not affect the free construal pattern between the classifier sansatu and the direct object.

1.3 Construal to indirect objects

When we turn our attention to the cases with indirect objects, what we obtain is the pattern exemplified in (7).

(7) Ditransitive V with DO and IDO

a. Syuppansya-ga tegami-o erai sensei hutari-ni okut-ta
   publisher-nom letter-acc prominent teacher two-cl-dat send-past
   ‘The publisher sent a letter to two prominent teachers’

b. *Hutari syuppansya-ga tegami-o erai sensei-ni okut-ta

c. *Syuppansya-ga hutari tegami-o erai sensei-ni okut-ta

d. *Syuppansya-ga tegami-o hutari erai sensei-ni okut-ta

e. *Syuppansya-ga tegami-o erai sensei-ni hutari okut-ta

The classifier hutari is not able to be construed to the indirect object sensei-ni except for in (7a). To obtain the classifier construal to the indirect object, the classifier has to be PP internal. The presence of other optional adjuncts in (7) does not change the construal pattern at all.

1.4 Construal to adjuncts

The construal pattern of classifiers to adjuncts is straightforward in that it behaves just as in the case with indirect objects in (7). The examples (8) and (9) below employ both intransitive and transitive verbs and show that classifiers have to be inside of PPs to get the intended construal.

(8) Intransitive V with source adjunct

a. Hikooki-ga ookii hikoozyoo sankasyo-kara Tookyoo-e tobitat-ta
   airplane-nom large airport three-cl-from Tokyo-to take-off-past
   ‘The airplanes took off from the three large airports to Tokyo’

b. *Sankasyo ookii hikooki-ga hikoozyoo-kara Tookyoo-e tobitat-ta

c. *Hikooki-ga sankasyo ookii hikoozyoo-kara Tookyoo-e tobitat-ta

d. *Hikooki-ga ookii hikoozyoo-kara sankasyo Tookyoo-e tobitat-ta

e. *Hikooki-ga ookii hikoozyoo-kara Tookyoo-e sankasyo tobitat-ta

In (8) the classifier sankasyo can only be construed to the locative adjunct hikoozyoo-kara when it occurs in between the noun and the postposition. Other construals are impossible. Exactly the same pattern obtains in (9) in that the construal between the classifier sanken and the locative adjunct
nomiya-ni is possible only when the classifier is internal to the PP. This concludes the discussion of the data.

2.0 Syntax of classifiers

Based on the distributional patterns established in the preceding section, this section offers a simple syntactic treatment of classifiers which, together with the semantic translation schema developed in the next section, correctly predicts possible classifier construal. The objective is accomplished in the following fashion. First, the group of classifiers that appear internal to PPs are distinguished from another group of classifiers that can occur outside of PPs. 7 8 Second, the latter type is further divided into two different main classes of classifiers by giving them separate and explicit lexical entries with appropriate syntactic and semantic types. Specifically, classifiers are treated as adjuncts (i.e. adverbs) that function as endocentric modifiers for V-projections. Third,

7 Intuitively, even at first glance, these two are distinct. The data in (i) and (ii) demonstrate this point clearly.

(i)  Taroo-ga [onna-yonin to otoko-gonin]-o mi-ta
    -nom woman-four and man-five-acc see-past
    'Taroo saw four women and five men'

(ii)  *Taroo-ga [yonin onna to gonin otoko]-o mi-ta
      -nom four woman and five man-acc see-past
      '(Int.)Taroo saw four women and five men'

(i) is grammatical but (ii) is not. The point is this: if the transformationally related structures as in (i) and (ii) involve the same 'floated quantifiers' (classifiers), why would we expect the patterns above? My suggestion will explain the difference easily. The two noun-classifier 'units' in (i) are nominal compounds, therefore can be conjoined with the conjunction to that normally conjoin multiple nominals. Contrarily, the two classifier-noun 'sequences' in (ii) are not nominals (and not even constituents!), hence the conjunction with to is impossible. Takano (1984) provides a different test with ‘cleft’ sentences that seems to reinforce the view expressed here, e.g. (iii) and (iv).

(iii)  Taroo-ga gakkoo-de at-ta-no-wa onna-yonin-da
      -nom school-at meet-past-comp-top woman-four-cop-pres
      'Who Taroo met at school is four women'

(iv)  *Taroo-ga gakkoo-de at-ta-no-wa yonin onna-da
      -nom school-at meet-past-comp-top four woman-cop-pres
      '(Int.)Who Taroo met at school is four women'

8 It is actually fair to add one more general group of classifier that takes forms like in (i), making the total number three. The essential difference between this class and others is that classifiers in (i) are prenominal modifiers. This type of classifier is ignored by the present study.

(i)  a. sannin-no gakusei-ga b. sansatu-no hon-o
    three-cl-of student-nom three-cl-of book-acc
    'three students' 'three books'

Ogihara (1987) suggests a plausible semantic treatment of these classifiers which is compatible with the present approach given in Section 3.
the relationship between a 'dislocated' classifier and its 'gap' is mediated by means of the SLASH Feature. In this way a classifier can be interpreted properly even when it is discontinuous from its construee.

2.1 Two general types of classifiers

2.1.1 PP internal classifiers

PP internal classifiers are best taken to be nominals. Though I do not have a definite proposal for this type, I suggest a plausible direction to take. The classifiers of this type have been introduced in the (a)-sentences of the examples (3) through (9) in Section 1. Typical examples of this type are as in (10).

(10) a. gakusei-san-nin-ga
    student-three-cl-nom
    'three students'

    b. tegami-go-tuu-o
    letter-five-cl-acc
    'five letters'

I propose that these classifiers (nominals) are combined with other nominals and form a nominal compound. So in (10a,b) gakusei-sannin and tegami-gotuu are complex nominals. It is plausible to think this way for the following reasons: 1) as seen in (10), the nominal-nominal unit can be combined with postpositions such as ga, o and many others that are normally combined with nominals, 2) the nominal-nominal unit is never interrupted by other items such as adjectives but can be modified by the same items if they precede the unit in question as seen in (11) and (12): 9

(11) a. gakusei-kanemotina-san-nin-ga
    student-rich-three-cl-nom
    '(Int.)three rich students'

    b. hon-ookii-go-satu-o
    book-big-five-cl-acc
    '(Int.)five big books'

(12) a. kanemotina gakusei-san-nin-ga
    richstudent-three-cl-nom
    'three rich students'

    b. ookii hon-go-satu-o
    bigbook-five-cl-acc
    'five big books'

I do not have any specific suggestion concerning how these complex units are formed but simply assume the existence of a general morphological process that is also responsible in forming many other very productive compound nominals in Japanese (like in Note 9). I do not have anything more to say about these classifiers in the rest of the paper. Obviously, indirect objects and adjuncts are able to be construed with classifiers through this first method.

9 We can compare the behavior of these nominal compounds to others in (i).

(i) a. gakusei-kaikan-ga
    student-union-nom
    'student union (building)'

    b. hon-dana-o
    book-shelf-acc
    'book shelf'

(ii) a. gakusei-ookii-kaikan-ga
    student-big-union-nom
    '(Int.)big student union'

    b. hon-benrina-dana-o
    book-useful-shelf-acc
    '(Int.)useful book shelf'

The items in (i) are nominal compounds taken by the postposition Heads, respectively. The nominal compounds cannot be interrupted by adjectives as seen in (ii) but if the adjectives precede the compound the PPs are OK.
2.1.2 PP external classifiers

The second type of classifiers are the central focus of the present study. This class is further divided into two sub-classes: 1) Subject Oriented Classifiers, 2) Direct object Oriented Classifiers. Each of these is given a proper syntactic and semantic types as its lexical specification as seen in (13) and (14) (each of which is a set of classifiers).

(13) \( SOC : \{ \text{POS ADV}; \text{SUBCAT}<>; \text{ADJUNCT IVP}; \text{SEM [IVP}_C/\text{IVP}'] \} \)

(where \( \text{POS: part of speech, SEM: semantic type} \))

(14) \( DOC : \{ \text{POS ADV}; \text{SUBCAT}<>; \text{ADJUNCT TVP}; \text{SEM [TVP}_C/\text{TVP}'] \} \)

The semantic types given in (13) and (14) are only abbreviations but they serve the present purpose. We see that both (13) and (14) say that classifiers of these types are adverbs that SUBCATEgorize for nothing. They function as endocentric modifiers (i.e. adjuncts) to [ntransitive] \( V[\text{verb}] P[\text{hrase}] s \) and [transitive] \( V[\text{verb}] P[\text{hrase}] s \), respectively. Semantically, (13) says this type of classifier takes an IVP meaning and returns a new IVP (i.e. IVP\(_C\)) meaning which is distinct from the original in such a way that this new meaning is the result of the classifier taking the original IVP as an argument. Similarly, (14) has the semantic type that takes a TVP meaning and returns an object of a new type, TVP\(_C\). In addition, I am assuming that the very next argument that combines with the V projection which has already been taken by a classifier is the semantic 'construee' of the classifier (see Section 3 for the explicit form given to this assumption).

2.2 Modification of verbal Heads by classifiers

The lexical specification given above alone does not get us anywhere. It is when those classifiers modify verbal projections that we obtain a significant result. A lexical entry for a typical verbal category will look like that in (15) with a transitive verb \( kaw \) 'buy.'

(15) \( kaw: \{ \text{POS V}; \text{SUBCAT}<PP-ga, PP-o>; \text{SEM kaw'} \} \)

This specifies that the verb, \( kaw \), subcategorizes for a subject PP and an object PP. POS and SUBCAT are Head Features (GKPS 1985). Let us see the way classifiers are incorporated into local trees in simple cases.\(^{11}\)

\(^{10}\) IVP and TVP are mnemonics that can be syntactically defined by their SUBCAT value specifications, for example:

(i) \( \text{IVP} = \{ V[\text{SUBCAT}<\text{PP-ga}>] \} \) \hspace{1cm} (ii) \( \text{TVP} = \{ V[\text{SUBCAT}<\text{PP-ga,PP-o}>] \} \)

\(^{11}\) Here I follow Gunji (1987) and adopt a general (one and only one) \( P[\text{hrase}] S[\text{tructure}] \) rule for Japanese in (i).

(i) \( M[\text{other}] \rightarrow D[\text{aughter}] H[\text{ead}] \)

This PS rule stipulates that the Head is always final in Japanese. There are different possibilities for the actual instantiation of the Daughter, i.e. complements or adjuncts. In the latter case which is relevant to the classifier distribution, the ADJUNCT Feature Principle (ii) is applicable which states that in adjunction structure (no actual adjunction 'operation' is involved) the value of the category valued feature ADJUNCT unifies with the category of the Head.
(16) S with SOC

a. Gakusei-ga sannin hon-o katta
   student-nom three-cl book-acc buy-past
   'Three student bought books'

b. V[SC<>] (=S)
   Pga V[SC<Pga>] (=IVP)
   gakusei-ga ADVP[AD IVp] V[SC<Pga>] (=IVP)
   sannin Po V[SC<Pga,Po>] (=TVP)
       hon-o katta

(17) S with DOC

a. Taroo-ga hon-o sansatu katta
   -nom book-acc three-cl buy-past
   'Taroo bought three books'

b. V[SC<>] (=S)
   Pga V[SC<Pga>] (=IVP)
   Taroo-ga Po V[SC<Pga,Po>] (=TVP)
       hon-o ADVP[AD TVP] V[SC<Pga,Po>] (=TVP)
           sansatu katta

Note in (16b) and (17b) the SUBCAT items specified on the Head are unified (GKPS 1985) with the complements fully one by one and cancelled out from the SUBCAT list (hence V[SUBCAT<>] = S).

The explicit definition given in (13) and (14) prevents over-generation of an illicit construal like in (18) which shows the intended construal between otoko-ga and sannin.

(18) *Otoko-ga hon-o sannin katta
    man-nom book-acc three-cl buy-past
    '(Int.) Three men bought the books'

This is due to the proper syntactic and semantic types assigned to the SOC sannin in that it can only take IVP and not TVP as in (18). However, this leads to a counterfactual prediction that the

(ii) In adjunction, M -> A H, the value of ADJUNCT of A unifies with H.

Also binary branching syntactic structure for Japanese, as assumed here, is defended in Fukushima (1988) with empirical evidence (see also Gunji 1987). Irrelevant details are suppressed in the analysis trees below.
sentence in (19a) is unambiguous.

(19)  a. Otoko-ga sannin onna-o but-ta
       man-nom three-cl woman-acc hit-past
       b. 'Three men hit the woman'
       c. 'The man hit three woman'

(19) is indeed ambiguous as indicated in (19b,c) and what I have said so far will account only for the reading in (19b), i.e. with the classifier as subject oriented. (20) is the only syntactic analysis of (19a) which is predicted by my account at the moment.

(20)

\[ \text{V[SC<]} \]
\[ \text{Pga} \]
\[ \text{V[SC<Pga>]} \]
\[ \text{otoko-ga} \]
\[ \text{ADV[AD IVP]} \]
\[ \text{sannin} \]
\[ \text{Po} \]
\[ \text{V[SC<Pga,Po>] } \]
\[ \text{onna-o } \]
\[ \text{butta} \]

In this structure the classifier \text{sannin} has to be subject oriented and can never be direct object oriented. The reason is simple. The syntactic and semantic types of the classifier requires an IVP and IVP meaning, respectively. Thus the sentence in (19a) will never produce the reading as in (19c). But the problem is that (19c) is also a possible reading of (19a). To see how (19c) is indeed possible, we have to turn to the analysis of the cases with 'dislocated' classifiers.

2.3 Long distance dependency involving classifiers

Let us put aside ambiguous (19a) for a while. Another (simpler) example of a DOC is given in (19).

(21) a. Taroo-ga hon-o sansatu kat-ta
       -nom book-acc three-cl buy-past
       'Taroo bought three books'
       b. Taroo-ga sansatu hon-o kat-ta
       c. Sansatu Taroo-ga hon-o kat-ta

In (21b,c) the classifier \text{sansatu} is 'dislocated' in the sense that it is not at a position which is required by its lexical specification. Nevertheless, these sentences are good with the classifier construed with the direct object \text{hon-o}. How can this fact be accounted for? The way out of this is to employ a SLASH Feature which is independently motivated for other long distance dependency phenomena, e.g. WH-gap relationship and topicalization in English (GKPS 1985), 'scrambling' in Japanese (Gunji 1987), etc. With the introduction of a SLASH Feature, hence the introduction of a null string (i.e. a 'gap') which is given a lexical status in Gunji (1987) as in (22), the structures in (21b,c) will be as in (23) and (24), respectively. \textsuperscript{12}

\[ \text{12 Gunji (1987) introduces a subject gap and an object gap as lexical elements. The present paper extends this idea to classifier gaps. For the exact semantic type of the classifier gaps consult (56) in Section 3.} \]
SLASH is a Foot Feature (GKPS 1985) which is rather freely transmitted between daughters and mothers. Here I assume a version of Foot Feature Principle as formulated by Gunji (1987) which allows unification of the Foot value of the Head daughter and the dislocated item, cancelling the SLASHed item from the Head. Thus the long distance relationship between the classifier and its gap is established.  

Coming back to sentence (19a), we can see the ambiguity is explained easily. The ambiguity is due to the possibility of the classifier sannin being either subject oriented or direct object oriented in this particular structure. The reading (19b) is to be analyzed as in (20) above with a SOC. In contrast, the reading (19c) will be analyzed in a similar fashion as in (23) above with a DOC. The latter employs a SLASH Feature that mediates the dependency between the classifier and its gap. The sentence in (25a) is also ambiguous in that this case is a ‘dislocated’ instance in two ways, thus both subject and direct object oriented classifiers have to be related to the gaps by the

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13 The Foot Feature Principle is formulated by Gunji (1987) as below:

Foot Feature Principle (FFP)

a. In complementation: The value of a Foot feature of the mother unifies with the union of her daughters.

b. In adjunction: The value of a Foot feature of the mother unifies with the union of her daughters, with the possible exception that one of the categories in the Foot feature of the daughters unifies with (modulo PFORM) with the adjunct and is not passed up to the mother.
SLASH Feature. I do not give the analysis trees but they are rather obvious.

(25) a. Sannin otoko-ga onna-o nagut-ta
    three-cl man-nom woman-acc hit-past
b. ‘Three man hit the woman’ (SOC reading)
c. ‘The man hit three women’ (DOC reading)

Finally, as was also mentioned above, an important point to notice is that the construal of a
given classifier to a common noun within a given PP is possible when the PP in question is the
very first argument (regardless of the possibility that it may be ‘dislocated’ as well) to the IVP or
TVP with which the classifier has already combined (see Section 3).

2.4 Classifiers in sentences with ditransitive verbs

What has been said so far is in fact a partial account for the data set given in Section 1.
There is another type of construction as in (26), namely sentences involving ditransitive verbs, that
needs to be considered. DOC in (14) (repeated in (27)) is to be employed in ditransitive
constructions as well. Four analysis trees corresponding to (26a-d) using (27) are given in (28–31).

(26) a. Taroo-ga hon-o sansatu sensei-ni okut-ta
    -nom book-acc three-cl teacher-to send-past
    ‘Taroo sent three books to the teacher’
b. Sansatu Taroo-ga hon-o sensei-ni okut-ta
c. Taroo-ga sansatu hon-o sensei-ni okut-ta
d. Taroo-ga hon-o sensei-ni sansatu okut-ta

(27) DOC: (POS ADV; SUBCAT(); ADJUNCT TVP; SEM [TVP_c/TVP]’) (=14)

(28) V[SC<>>] (=26a)

(29) V[SC<>>] (=26b)
In (28) the classifier is in the proper position required by the lexical requirement in (27); no extra mechanism is involved. (29) and (30) show only ‘dislocated’ classifiers which are related to their gaps via SLASH. (31) is an instance of ‘scrambling’ which is going to be considered in detail in the next subsection in terms of its interaction with dislocated classifiers. In all these trees, the DOC 

One thing we should note here is that the present analysis explains why it is not possible to construe a classifier from the position following a direct object (in (26) it will be any position following hon-o) to a subject. (Other similar examples can be seen in (4) above.) The reason turns out to be simple. Due to the type mismatch, a SOC cannot be interpreted in this position which will be the immediate local domain of the V Head (i.e. V[SC<PPga,PPo>]) whose syntactic and semantic types are not IVP and IVP' as required by the lexical entry of a SOC. This, however, does not rule out the possibility of a DOC to occur here.

2.5 Interaction between classifiers and scrambling

Finally, the time has come to discuss the cumbersome but syntactically important subject of
classifier distribution in sentences with word order variation (alias 'scrambling'). 14 'Scrambled' structures provide counter examples to the classifier analyses given above, if Gunji's (1987) analysis of scrambling (the SUBCAT approach which takes advantage of the unordered SUBCAT value list to be maintained. As far as the present analysis is concerned, scrambling is handled utilizing only the SLASH approach which is simultaneously introduced as an alternative by Gunji. 16 Following P&S (1987), I assume that the SUBCAT value list is indeed ordered, hence the ordered pair notation '<...>' for the SUBCAT list which signifies a hierarchical complement order of obliqueness (see also Pollard 1985). Let us see how the interaction between scrambling and dislocated classifiers is accounted for by the present analysis. 16

14 I exclude the cases of scrambling which cross a clause boundary from the discussion in this paper. The extension of the present system to cover these cases requires extra assumptions which I am not prepared to talk about (c.f. Note 15).

15 The employment of SLASH for scrambling cases entails that the phenomena are treated as basically unbounded. This is justified by the fact that scrambling can 'move' elements across a clause boundary as seen in (i).

a. Hanako-ga [Taroo-ga esa-o inu-ni yat-ta]-to omotte-iru  
   -nom -nom food-acc dog-dat give-past-comp think-pres  
   'Hanako knows that Taroo gave some food to a dog'

b. Esa-o1 inu-ni2 Hanako-ga [Taroo-ga ___1 ___2 yat-ta]-to omotte-iru

c. Inu-ni1 esa-o2 Hanako-ga [Taroo-ga ___1 ___2 yat-ta]-to omotte-iru

However, there are cases where crossing of a clause boundary is not allowed, e.g. (ii) and (iii).

(ii) a. Hanako-ga Ziroo-ni [Taroo-ga sensei-ni hon-o okut-ta]-to it-ta  
   'Hanako told Ziroo that Taroo sent a book to the teacher'

b. *Sensei-ni1 Hanako-ga Ziroo-ni [Taroo-ga hon-o ___1 okut-ta]-to it-ta (wrong reading)

(iii) a. Hanako-ga [Taroo-ga gakkoo-de nai-ta]-to omotte-iru  
   -nom -nom school-at cry-past-comp think-pres  
   'Hanako thinks that Taroo cried at school'

b. *Gakkoo-de1 Hanako-ga [Taroo-ga ___1 nai-ta]-to omotte-iru (wrong reading)

What we can conclude from the facts above is that scrambling is basically unbounded (as also argued in Saito 1985) with further restrictions that excludes unwarranted cases of long distance dependency. The account of scrambling presented below has to be modified accordingly (see Fukushima 1987).

16 This may be desirable on independent grounds because doing so motivates the applicability of obliqueness hierarchy of SUBCAT value list in general. In HPSG (e.g. P&S 1987, Sag and Pollard 1988) this concept plays a central role and is motivated by several independent factors. As far as Japanese is concerned, the hierarchy can be motivated not only for the classifier distribution but also for some control phenomena which involve what Gunji (1987) called 'VP-embedding' structure such as causatives and benefactives. In Fukushima (in preparation) it is argued, along the line of Sag and Pollard 1988, that a controller for a given embedded IVP does not have to be stipulated in the semantics of each VP-embedding verbs separately. Rather the selection of a controller falls out naturally as the function of the three verb classes (commitment, directive, and attitude) and the O[blequeness] C[ontroll] P[inciple]. In this paper obliqueness of the SUBCAT list increases from le
(32) a. Taroo-ga hon-o sansatu sensei-ni okut-ta (=26a)
   book-acc three-cl teacher-to send-past
   ‘Taroo sent three books to the teacher’
b. Hon-o sensei-ni Taroo-ga sansatu okut-ta
c. Sansatu Taroo-ga sensei-ni hon-o okut-ta

In (32b,c) are two quasi randomly generated scrambled versions of (32a). And (36) and (37) below are the syntactic analyses of (32b) and (32c), respectively. In (33), (34), and (35) are the direct and indirect object gaps and the gap for SOC and DOC.

(33) Lexical gap for a CN direct object
   e: (POS PP; SUBCAT<>; SLASH(PPo; SEM CN'); SEM [CN/CN'])

(34) Lexical gap for a CN indirect object
   e: (POS PP; SUBCAT<>; SLASH(PPni; SEM CN'); SEM [CN/CN'])

(35) Lexical gaps for SOC and DOC
   a. e: (POS ADVP; SUBCAT<>; SLASH(ADVP; SEM [IVPc/IVP']); SEM ...
   b. e: (POS ADVP; SUBCAT<>; SLASH(ADVP; SEM [TVPc/TVP']); SEM ...

(36) \[V[SC<>] (32b)

\[
\begin{array}{c}
\text{Po} \\
\text{V[SC<>]/Po} \\
\text{hon-o} \\
\text{Pni} \\
\text{V[SC<>]/Pni,Po} \\
\text{sensei-ni} \\
\text{Pga} \\
\text{V[SC<Pga>]/Pni,Po} \\
\text{Taroo-ga} \\
\text{Po/Po} \\
\text{V[SC<Pga,Po>]/Pni} \\
\text{e} \\
\text{ADVP} \\
\text{sansatu} \\
\text{Pni/Pni} \\
\text{V[SC<Pga,Po,Pni>]} \\
\end{array}
\]

\[\text{to right.}\]

25
In (36) we see a case with only PP scrambling in which PP-ni and PP-o are dislocated and are related to their gaps by the SLASH Feature. As the direct object hon-o is still the next argument that is to be taken by the TVP, the classifier sansatu will be construed with this PP without any problem. What is seen in (37) is a little different in that we see that both the classifier sansatu and the indirect object sensei-ni are 'dislocated.' But here again via SLASH the direct object is still the next argument to the TVP, making the construal possible.

The scrambling examples above are by no means exhaustive. If there is no restriction on the null string introduction, the system as it stands at the moment will allow massive over-generation as exemplified in (38).  

(38) a. *Otoko-ga hon-o sannin kat-ta
man-nom book-acc three buy-past
'(Int.) Three men bought the book'

b. V[SC<>]

In (33b) is one logically possible syntactic analysis of a (vacuously) 'scrambled' structure of (38a)

17 This (undesirable, nevertheless,) logical consequence was pointed out to me independently by Dick Oehrle, Sue Steele, and the two reviewers of Linguistics and Philosophy.
which the present analysis counter-factually predicts to be well-formed. To remedy unfavorable results like this, the Feature Co-occurrence Restriction (FCR) (39) is stipulated for Japanese. This FCR amounts to a prohibition on the introduction of gaps for PPs with the postposition ga. Unlike for English cases in general, the convention seems to be necessary to achieve a proper application of the SLASH Feature for languages like Japanese where multiple gaps of different kinds and rather flexible unification between gaps and fillers seem to be needed.

(39) Feature Co-occurrence Restriction (FCR)

\(<\text{SLASH}> \rightarrow \text{<PFORM \{-ga\}>} (\text{PFORM: postpositional form; a multi-valued feature})\)

The FCR (39) states that the feature SLASH can co-occur with an attribute PFORM whose value can be any postposition except for ga. Given (39), (38b) is no longer a possible analysis for (38a) because the introduction of the subject gap is not possible. Let us see one more example in which the classifier, sannin, is intended to be subject oriented. The example (40) will not be generated simply because the subject gap is not allowed by (39).

(40) a. *Otoko-ga sensei-ni hon-o sannin okut-ta
   man-nom teacher-dat book-acc three send-past
   ‘(Int.)Three men sent a book to the teacher’

b. V[-]
   Pga V[-]
   otoko-ga Pni V[-]
   sensei-ni Po V[-]
   hon-o Pga/Pga V[SC<Pga>]/Pni,Po
   e ADVP V[SC<Pga>]/Pni,Po
   sannin Po/Po V[SC<Pga,Po>]/Pni
   e Pni/Pni V[SC<Pga,Po,Pni>]
   e okutta

Ad hoc though it may sound, this FCR can also be motivated on independent grounds. First, it can rule out ill-formed scrambled cases like (41b) and (42b). The ga-marked objects in the stative sentences in (41a) and (42a) cannot be scrambled at all. Note that, generally in Japanese, scrambling is totally free within a single S as long as the main verb remains final.

(41) a. Taroo-ga sakana-ga suki-da
   -nom fish-nom fond-of-cop-pres
   ‘Taroo likes fish’
   b. *Sakana-ga Taroo-ga suki-da (wrong reading)

(42) a. Hanako-ga hon-ga hosi-i
   -nom book-nom want-pres
   ‘Hanako wants a book’
   b. *Hon-ga Hanako-ga hosi-i

Second, another consequence of the FCR is that it will force a ‘gap-less’ analysis for a relative clause which might be considered to contain a subject gap. In such an analysis a relative clause with a subject gap is taken to be a ‘relative IVP’ that is to be controlled by the head noun. This
analysis has a desirable consequence in such a way that the contrast between the structures in (43ac) on the one hand and (43b) on the other is explained due to the ‘category’ mismatch (in its broader sense as in GKPS 1985 treatment of coordination). In (43a) two IVPs are coordinated; in (43b) an IVP and an S/PP; in (43c) two S/PP’s. Only (43b) is ungrammatical.

   ‘the man who [went home and cried]’

   ‘the man who [went home and Taroo met]’

   ‘the teacher who [Taroo respects and Mary sent a book to]’

Thus the FCR solves three unrelated problems and should enjoy the status of a well-motivated stipulation. 18

2.6 Problematic cases

In general, the syntactic treatment outlined seems to cover the classifier construal patterns adequately. However, there are some facts left unanswered by the present approach. Some of these cases are found in Miyagawa (1987) and are given in (44–46) as the (a)-sentences. The judgments are mine. (The comma in the sentences indicates a pause). In (44a) the classifier futari is ‘dislocated’ from the position between gakusei-ga and omiyage-o. In (45a) the adjunct kompuitaade occurs between the subject gakusei-ga and the classifier futari. (46a) is the case where both sansatu and hon-o have been ‘scrambled’ to the position before gakusei-ga. And (44b), (45b–c), and (46b) are the grammatical counterparts of the (a)-sentences which seem to possess the same structural properties.

(44) a. ??Futari, Tanaka -san-ni gakusei-ga omiyage-o age-ta
two-cl -Mr.-dat student-nom souvenir-acc give-past
   ‘Two students gave souvenirs to Mr. Tanaka’

b. Futari, sensei-ni gakusei-ga hon-o age-ta
two-cl teacher-dat student-nom book-acc give-past
   ‘Two students gave books to the teacher’

18 Careful readers may have noticed that the prohibition on a PP-ga gap will be potentially problematic when we consider a stative sentence (e.g. (41a)) used as a relative clause as in (i).

(i) Hanako-wa [NP[S/PP Taroo- ga e1 sukina] sakanai-o sitte-iru
   -top -nom fond-of fish-acc know-pres
   ‘Hanako knows the fish which Taroo likes’

Due to the FCR (39), the gap of the (supposedly) ga–marked PP object is not allowed, making (i) an impossible analysis. But this problem is only apparent in light of an example like in (ii) in which the object of the stative sentence can also be realized as an ə-marked PP.

(ii) Taroo-ga sakana-o sukida
I concede that the (a)-sentences in (44-46) are not that good. However, it is not clear to me that these are ruled out, as Miyagawa (1987) claims, by syntactic factors per se. If it is the case then we also should expect the ungrammaticality of the (b)-sentences that appear to be structurally identical to the (a)-sentences. The present system accepts all the cases found in (44-46). For example, (44ab) are analyzed as in (47) and (48).
What is important here is the fact that the (b)-sentences are indeed grammatical. Thus there should be some extra factors involved which make the (a)-sentences rather bad. It may as well be the case that the (a)-sentences somehow create a processing difficulty.

2.7 Summary

In this section we have seen the present syntactic treatment of Japanese classifiers. The main concern was the class of PP external classifiers. It was shown that by separating these classifiers into two main classes, namely SOC's and DOC's, and assigning proper syntactic as well as semantic types to each, we can account for their distributional patterns. Also demonstrated was the treatment of dislocated classifiers and the cases involving scrambling which utilizes a SLASH Feature.

3.0 Semantics of classifiers

In this section I show how the semantic interpretation of classifiers is carried out. The important point is that the syntax and semantics of classifiers are to accompany each other side by side. This point was partially demonstrated above when the difference between SOC's and DOC's was discussed in that the syntactic and semantic type mismatch prohibits SOC's being construed to direct objects and vice versa. The notion of type mismatch is made more explicit in this section. Further semantic conditions on the classifier interpretation are introduced in the form of meaning postulates which not only restricts the classifier-construee relationship as a subset relationship but also imposes the cardinality restriction. In this respect the present approach contrasts with those in the literature which treated 'Quantifier Movement' as a purely syntactic phenomena and in which all efforts have been directed toward obtaining correct 'surface' forms only.

The basic idea is this: semantically speaking, a PP external classifier relates VP-denotations to C[ommon] N[oun] denotations. That is to say that a PP external classifier takes a denotation of an IVP or TVP and returns a denotation of a special IVP or TVP (i.e. IVP<sub>C</sub> and TVP<sub>C</sub> above), that in turn will take a denotation of a CN. The semantic rules of classifiers formulated below will ensure the proper relationship.

---

19 This was suggested to me by Dick Oehrle but any error in the implementation of the idea is of course my own. See also Dowty and Brodie (1984).
3.1 Semantic translation schema with classifiers

Following a Model Theoretic approach to semantics, we need to employ semantic types that are associated with individual participant constituents to discuss the semantics of classifiers. I adopt the function TYP from GKPS (1985) that, given a syntactic category X, returns the semantic type of X. Ignoring intensionality, we get the following assignment (49) and the corresponding (only for (49c-j)) Japanese basic vocabulary (50).

(49) Semantic types

\[
\begin{align*}
a. \ TYP(S) &= t \\
b. \ TYP(IVP) &= \langle e, t, t, t \rangle \\
c. \ TYP(TVP) &= \langle e, t, t, \langle e, t, t, t \rangle, t \rangle \\
d. \ TYP(DTVP) &= \langle e, t, t, \langle e, t, t, t \rangle, \langle e, t, t, t \rangle, t \rangle \\
e. \ TYP(CN) &= \langle e, t \rangle \\
f. \ TYP(PN) &= \langle e, t, t \rangle \\
g. \ TYP(DET) &= \langle e, t \rangle \\
h. \ TYP(SOC) &= \langle e, t \rangle \\
i. \ TYP(DOC) &= \langle e, t \rangle \\
j. \ TYP(SOC) &= \langle e, t \rangle \\
k. \ TYP(DOC) &= \langle e, t \rangle \\
\end{align*}
\]

(50) Basic vocabulary (for (49c-j))

\[
\begin{align*}
c. \ & \text{tabe, nagur, etc. ...} \\
d. \ & \text{okur, age, etc. ...} \\
e. \ & \text{onna, otoko, sensei, hon, etc. ...} \\
f. \ & \text{Taro, Hanako, Tookyoo, etc. ...} \\
g. \ & \text{ga, o, ni.} \\
h. \ & \text{aru, arayuru, ikutukano, subeteno, sono, etc. ...} \\
i. \ & \text{three-person, three-booklet, five-person, six-long-object} \\
j. \ & \text{three-person, three-booklet, five-person, six-long-object}
\end{align*}
\]

Provided with the semantic types in (49), we can proceed and do a simple case for a demonstration. (51a) is an example of a SOC accompanied by the (simplified) syntactic structure in (51b) and the semantic translation in (51c).

20 When a CN is used alone in an appropriate context, I assume there is some type shifting rule (Partee 1986) that changes the type of the CN (\langle e, t \rangle) to that of a quantifier (\langle e, t, t, t \rangle).

21 Here \text{ga} is the so called 'neutral description' and \text{ni} is dative and not locative.
The translation schema is essentially that of Type Driven Translation (Klein and Sag 1985, see also GKPS 1985) which claims that semantic translation rules need not be stated on a rule-to-rule basis but rather the semantic type of the mother category can be determined by semantic types of the daughter constituents that are to combine (by functional application (e.g. Zeevat 1988)) in a given local tree. In (51c) it is easy to see the meaning of the larger unit is recursively built up from smaller units systematically. Any mismatch of the semantic types will result in an uninterpretable structure. However, the translation schema does not quite give the right interpretation yet. We want to guarantee that the very first CN argument which is taken by the quantified V projection is indeed the constituent with which the classifier agrees. In the present study this is accomplished by meaning postulates, such as in (52) for (51c). 22

(52) ∃b Vf[(gonin'(b))(P) <-> Card( λx[ b( λQ(x))] ∩ P)=5 & P ⊆ nin']

(53) a. Taroo -ga hon -o sansatu kat -ta

' Taroo bought three books'
The translation schema outlined naturally accounts for some basic facts surrounding classifiers. First, the relationship between a given classifier and the objects that are counted by it are restricted by a sub set relation. So the forms which exhibit mismatches of the CNs and the classifiers as in (54) are not acceptable.

\[
\forall b \forall p \forall \mathcal{P} \left[ \left( \text{sansatu}'(b) \right) (\mathcal{P}) \leftrightarrow \text{Card}(\lambda x[\lambda Q(Q(x))(\mathcal{P})] \land p=3 \land p \leq \text{satu}'] \right]
\]

(where $b : \text{TVP'}$, $\mathcal{P} : \text{NP'}$, $p : \text{CN}$, $Q : (e,t)$, Card : cardinality)

In addition to this, it follows from the present conjecture that if a given CN is already quantified (i.e. taken as an argument) by a quantified V projection, then it is no longer possible to quantify that same CN. This is shown in (55b-d).

(55b) is the case with multiple quantification on a single CN otoko. (55cd) are the cases with quantification on quantifiers sono otoko ‘the man’ and Taroo both of which is of type $<e,t>,t$ which cannot be properly taken by the quantified V projection due to the type mismatch. (55d) is possible only if there are three persons who are named Taroo. But this is not the reading with the proper name as a quantifier.

Above we have seen how the semantic translation schema works in simple sentences. But this is not all to the translation schema in that we still have to take care of the cases with dislocated classifiers. Here I only introduce a general strategy that is to be supplemented with the details similar to those shown in (51-53) above. In (56) is a semantic type for a subject oriented classifier gap which is employed in (57c).
(56) Semantic type for a SOC gap
\[ \lambda \text{IVP'} \lambda \text{CN'} \lambda[(\text{IVP}_C/\text{IVP})'[(\text{IVP}_C/\text{IVP})'(\text{IVP}')](\text{CN}')] \]

(57) Translation with SLASH

a. Sannin otoko-ga ki-ta
   three-person man-nom come-past
   'Three man came'

b. S, sannin otoko-ga kita
   ADVP, sannin S/ADVP, otoko-ga kita
   PP, otoko-ga IVP/ADVP, kita
   ADVP/ADVP, e IVP, kita

c. (sannin'(kita'))(otoko'), ([IVP_C/IVP]'(IVP'))(CN')
   sannin', [IVP_C/IVP]' (e'(kita'))(otoko'), \lambda[IVP_C/IVP]'[(\text{IVP}_C/\text{IVP})'(\text{IVP}')](\text{CN}')]\]
   otoko', cn' e'(kita'), \lambda \text{CN'} \lambda[IVP_C/IVP]'[(\text{IVP}_C/\text{IVP})'(\text{IVP}')](\text{CN}')]\]
   e', \lambda \text{IVP'} \lambda \text{CN'} \lambda[IVP_C/IVP]'[(\text{IVP}_C/\text{IVP})'(\text{IVP}')](\text{CN}')]\]
   kita', IVP'

In (57bc) are the simplified syntactic structure and the semantic translation for (57a). There are two important points that should be mentioned here with respect to the semantic type of the SOC gap (56). First, when the SOC gap is combined with the IVP making an IVP_C, the semantic type of the original subject NP argument of the IVP is changed to a CN. Second, the CN becomes the very next argument (i.e. the construee of the classifier) that has to be taken by the IVP_C. Lambda conversion will provide a missing classifier meaning and functional application will take care of the rest. The cases with scrambling are treated in the similar fashion. We see one more example below with a direct object PP Hanako-o scrambled.

(58) a. Hanako-o otoko-ga sannin but-ta
   -acc man-nom three hit-past
   'Three man hit Hanako'

b. S, Hanako-o otoko-ga sannin butta
   PP, Hanako-o S/PP, otoko-ga sannin butta
   PP, otoko-ga IVP/PP, sannin butta
   ADVP, sannin IVP/PP, butta
   PP/PP, e TVP, butta
In (58c) is the semantic translation for (58a) in which the relationship between the gap of the object NP Hanako is mediated via SLASH. Crucially, when the subject oriented classifier sannin and the IVP/PP butta combine forming IVPc, the same semantic changes we saw in (57c) occurs. That is: 1) the type of the original subject NP argument of the original IVP is changed to a CN and 2) this CN is the next immediate argument of the IVPc. This point is important in preventing an impossible sentence like in (59).

(59) *Otoko -ga Hanako -o sannin e but -ta
man -nom -acc three hit -past
'(Int.) Three man hit Hanako'

If the classifier sannin is taken to be subject oriented, (59) will not be given the intended analysis (or any other for that matter) because the next argument taken by the IVPc, sannin e butta, will be interpreted as a subject but Hanako is intended to be a direct object. Together with the Feature Co-occurrence Restriction (39) which prohibits the gap of PP-ga, the present system does not generate sentences like (58). This concludes the semantics of classifiers.

4.0 Miyagawa's GB analysis of 'floating quantifiers'

In the preceding two sections I have outlined the non-floating analysis of the classifier distribution. To appreciate the explicit formalism and the precise predictions of the present account, let us review Miyagawa (1987) as a sample floating account for classifiers (called Numeral Quantifiers by Miyagawa), and compare it to the present one. 23

4.1 Miyagawa's core assumptions and the predictions

Miyagawa’s assumptions can be summarized in the following manner:

(60) a. Classifiers are predicates (in the sense of Williams 1981) to the nouns they modify.

b. The structural relationship between the classifiers and nouns they modify is that of ‘mutual C-command.’

c. Postpositions such as ga and o (and possibly dative ni) do not project a maximal node and are only 'cliticized' onto NPs (this is crucial for the mutual C-command) but other postpositions do project a maximal node. This depends on whether the postpositions have "semantic content" or not. The former set of postpositions are taken to be semantically vacuous.

23 Miyagawa's proposals of 1987 and 1988 are essentially the same. Here we see the former which is actually newer.
d. A position (called a virtual Argument position) at which classifiers can leave their traces is 'licensed' by the verb if the classifier modifies an 'affected theme' NP and the NP and the classifier are governed by the verb that assigns this theta-role to the NP.

e. A classifier can leave a trace only in a virtual A-position.

f. There are Japanese verbs that belong to the 'ergative' class. These verbs have their 'surface' subject within their VP in DS and assign theme role to it. Later, the VP internal 'subject' is preposed to the 'surface' subject position. This enables the verbs to govern the subject as well as the classifier (if there is one), hence making the classifier position a virtual A-position. Also the subject and the classifier C-command each other in DS.

Given these assumptions, Miyagawa predicts (the predictions can be represented schematically as in (61) and (62) below) the following distributional patterns of classifiers. A dislocated classifier can modify only an object of a transitive verb and a subject of an ergative verb. So in (61a) the classifier can be moved from the VP internal position to the S initial position. (61b) shows the movement of both the classifier and the "deep" object of an ergative verb from the VP internal position. In both cases the modified NP and the classifier occur within the VP in DS and are governed by the verb as well as mutually C-command each other either directly or via the trace of each other. In contrast, subjects of transitive and non-ergative verbs as in (62) cannot be modified by a dislocated classifier because the trace of the classifier is not within the VP, i.e. it is not in a virtual A-position and the classifier trace is not licensed properly.

(61) Possible modification structures

a. Transitive object

\[
\begin{align*}
\text{S} & \\
\text{CL}_i & \text{S} & \text{VP} \\
\text{NP} & \text{t}_i & \text{V} \\
\end{align*}
\]

b. Ergative subject

\[
\begin{align*}
\text{S} & \\
\text{CL}_i & \text{S} & \text{VP} & \text{NP}_j \\
\text{t}_j & \text{t}_i & \text{V}_{\text{erg}} \\
\end{align*}
\]

(62) Impossible modification structures

a. Transitive subject

* \[
\begin{align*}
\text{S} & \\
\text{CL}_i & \text{S} & \text{VP} \\
\text{NP} & \text{t}_i & \text{V} \\
\end{align*}
\]

b. Non-ergative subject

* \[
\begin{align*}
\text{S} & \\
\text{CL}_i & \text{S} & \text{VP} \\
\text{NP} & \text{t}_i & \text{V} \\
\end{align*}
\]

The predictions seen in (61) and (62) appear to be true when we consider only the examples provided by Miyagawa but there are cases (some seen above in Section 2 and some given below) that contradict Miyagawa's conjecture.

4.2 Predictions by Miyagawa's system
In addition to the problems for his system pointed out above, there are at least three more uncertain aspects to Miyagawa's suggestion on empirical and/or conceptual ground. 1) The assumption (60c) that postpositions such as ga and o do not project a maximal node because they are 'semantically vacuous' seems to be misguided. \(^24\) 2) The existence of the ergative verb class seems to be theory internal. And even Miyagawa's theory internal motivation appears to be not enough. 3) The assumption (60d) is implausible due to the unclear status of the theta-role, an 'affected theme' (Martin 1975; discussed below), and unreliableness of what Miyagawa calls a 'syntactic test' that is to distinguish the class of verbs which assign this theta-role and those which do not.

The third point above, the assumption (60d) repeated in (63), is rather serious. We review only this point but this is enough to show the inadequacy of Miyagawa's system on the empirical ground.

(63) The position (called a virtual A[rgument] position) at which classifiers can leave their traces is 'licensed' by the verb if the classifier modifies an 'affected theme' NP and the NP and the classifier are governed by the verb that assigns this theta-role to the NP.

This assumption together with (60e) is employed for predicate licensing, the main proposal of Miyagawa (1987). According to this licensing system, if a verb does not assign the (affected) theme role to a NP then there will be no virtual A-position at which a classifier can legitimately leave its trace when it 'floats away.' This conjecture is to explain the contrast in (64). (The grammaticality judgement in (64b) is of Miyagawa. (64b) is OK for the present author.)

(64) a. Futatu, Taroo-ga [VP mado-o t] ake-ta] two-cl -nom window open-past
    'Taroo opened two windows'

    'Taroo yelled at two children'

Miyagawa explains that in (64a) the verb ake assigns a theme role to the object NP, mado, thus the trace left in VP by the classifier is in virtual A-position (due to (63)). This is not the case with (64b) whose verb donar does not assign a theme role to the object NP kodomo making the trace position a non-virtual A-position. It is important for Miyagawa to motivate the differences between verbs that assign the (affected) theme role and those that do not. He does so by appealing to the following two things: 1) the classification of (affected) themes by Martin (1975) and 2) the syntactic test utilizing intransitivizing resultative constructions (Martin 1975). For brevity, let us assume the adequacy of the first and examine only the second point. \(^25\)

Martin's list of eight (affected) theme roles (which is actually called by Martin "a wide variety of semantic relationships", suggesting it may not be a coherent unit) in Japanese is given in (65) (together with verbs that assign such a role) of which only four are chosen by Miyagawa as

\(^{24}\) See for example Kuno (1973) which defines the meaning of the postpositions labeled "semantically vacuous" by Miyagawa.

\(^{25}\) But this is not to say that the notion of 'affected theme' (or any other thematic roles for that matter) is problem-free. For example Dowty (1988) raises some objections to the traditional thematic roles based on their nebulous nature. He thinks it is virtually impossible to define thematic roles explicitly, as has been attempted unsuccessfully in the literature, in an once and for all manner.

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independent criteria' for the theme role in question.

(65) a. that which is moved: okur `send', das `put out', tor `take (away)', etc.
b. that which is exchanged: (tori-)kae `exchange', etc.
c. that which is created: tukur `make', tate `build', iw `say', hanas `speak', etc.
d. that which is converted: naos `repair', su `make someone something'
e. that which is extinguished, consumed, destroyed, or gotten rid of: kes `extinguish', tebe `eat', kowas `break', wasure `forget', etc.
f. that which is to be put on to be worn or which is worn: ki `wear', hak `wear', kabur `wear', etc.
g. that which is perceived: mi `see', kik `hear', kanzi `feel', etc.
h. that to which attention is paid for the purpose of direct or indirect perception: mi `look at', kik `listen', kag `smell', etc.

Given the list (65) we can examine the adequacy of the syntactic test for the theme-role-assigning verbs utilizing intransitivizing resultative constructions of which (66a) is one example. It seems to be the case that the syntactic test is very shaky. Miyagawa claims that sentences which pass this test contain a verb that assigns a theme role to its 'deep' object (hence the 'surface' subject). Thus the contrast in (66).

(66) a. Madoi -ga [Vp ti akete-ar-u]
   window-nom open-exist-pres
   `Windows have been left open'
b. *Hanako -ga [Vp ti aisite-ar-u]
   -nom love-exist-pres
   `Hanako has been loved'

In (66a) is the verb ake which passes this test. Miyagawa simply states that in (66b) Hanako does not receive a theme role because it fails the test. (If not a theme, what would it be?) So ais is not a theme role assigner. But it should follow from this that any item that appears in list (65) should both pass this test (as (66a) does) and allow a dislocated classifier modifying an object that is to be 'floated' from the virtual A-position within the VP where mutual C-command condition holds between the classifier trace and the object. This has to be so because the verbs in (65) are all theme-role-assigning verbs which should behave in a consistent manner with respect to the syntactic test which Miyagawa claims valid. This conjecture turns out to be false.

(67) a. *Monogatari -ga hanasite-ar-u
   fairy tale-nom speak-exist-pres
   `The fairy tales have been told'
b. Futatu, Taroo -ga kodomo-ni monogatari-o hanasi-ta
   two-cl -nom child-to fairy tale-acc speak-past
   `Taroo told two fairy tales to the child'

(68) a. *Yakusoku -ga wasurete-ar-u
   promise-nom forget-exist-pres
   `The promise has been forgotten'
b. Mittu, Taroo -ga yakusoku-o wasure-ta
   three-cl -nom promise-acc forget-past
   `Taroo forgot three promises'
(69) a. *Nioi-ga kaide-ar-u
smell-nom sniff-exist-pres
'The smell has been sniffed'
b. Hitotu, Taroo-ga henna nioi-o kai-da
one-cl -nom strange smell-acc sniff-past
'Taroo sniffed one strange smell'

What we see in (67–69) is that the three verbs hanas, wasure, and kag that belong to the list (65) actually fail to pass the theme-verb-test as seen in the (a)-sentences but nevertheless allow dislocated classifiers to be construed to the object as in the (b)-sentences. This of course is not expected by Miyagawa's account. Moreover, there are numerous verbs that do not belong to/appear in the list which also fail the test but allow the same pattern of classifier construal as the (b)-sentences above, e.g. hakkensu 'discover', kizuk 'notice', oboe 'remember', hazime 'begin', oe 'finish', nakus 'lose', etc.

What this shows is that Miyagawa's system which crucially relies on the notion of virtual A-position (which in turn depends on the theme role assignment by a given verb) for the licensing of a classifier trace does not predict what is possible and what is not systematically and consistently. If the test is so unreliable then what would guarantee whether a given verb assigns the theme role or not? Without such a firm independent criterion enabling the identification of the theme-role-assigning verb class, the account can easily fall into a vicious circle claiming that movement of classifier is not possible because a verb does not assign a theme role and a given verb does not assign a theme role because the movement of classifiers is not possible.

4.3 Comparison and summary

The theory I proposed in Section 2 and 3 and that of Miyagawa are in contrast in the following two respects. First, the present account predicts all the grammatical structures of classifier construal as well as some problematic cases seen in Section 2.6. As pointed out above (also in Section 2.6), the problematic cases are not favorable for Miyagawa either. This is because his system incorrectly rules out grammatical sentences which have the identical/similar structural properties as the "bad" ones. Second, the present account, due to its explicit mechanism, is able to make precise predictions with respect to what should be possible and impossible but Miyagawa's conjecture does not do so because of some inexplicit and unreliable assumptions and syntactic tests involved in the system some of which have been reviewed above. Based on these points it seems to be the case that the present non-transformational account is preferable over the movement account.

5 Conclusion

What has been shown in the present paper is a new solution for an old problem, i.e. the proper treatment of 'floated' quantifiers (classifiers). It was demonstrated that reanalyzing so called 'floated' quantifiers as non-floated (adverbial) classifiers offers an adequate and principled account of the phenomena in question. The assignment of a proper lexical entry, which includes syntactic and semantic types, to each class of classifiers (either subject oriented or direct object oriented) makes this possible. It should be emphasized that, as shown in Section 2 and 3, it was not just syntactic conditions alone that regulate the distribution of classifiers but rather the interaction of the syntactic and semantic types of the classifiers play a crucial role in obtaining interpretable sentences. This point separates the present approach from others that are merely concerned with obtaining correct 'surface' forms. Though some minor details may not have been worked out thoroughly or satisfactorily in the text, it is my belief that at least a plausible direction to take is explicit in the present proposal.
References


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