3 Japanese semantics and the mass/count distinction[1]

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1 Introduction

Recent development of plural logic[3] is good news for students of the semantics of languages that have no systematic distinction between singular and plural, such as Japanese. Plural logic gives us a semantical framework in which reference and predication need not be semantically singular. The traditional assumption that they should be semantically singular or reducible to singular constructions has precluded a natural account of the expressions of number-neutral languages, such as Japanese. For example, in the Japanese sentence[4]

(1) Kodomo   ga   waratta.
    child(ren)   NOM   laughed
    (A child/The child/Children/The children laughed.)

The noun *kodomo* may denote a number of children, as well as a single child.[5] But there is no expression that corresponds to the noun in symbolic languages standardly used in formal semantics for expressing truth conditions of natural language sentences such as languages of predicate logic, in which all predicates should be singular; that is, they can be true of single things only separately, not jointly.

If we stick to such metalanguages, we have to turn *kodomo* somehow to a singular predicate. The usual way to do this is to interpret *kodomo* as referring to a set consisting of a number of children or a mereological sum of them.[6]

It could be argued that this way of proceeding is unsatisfactory.[7] Instead of introducing 'plural objects' like sets or mereological sums, we can change the logic of our metalanguage and allow plural reference and predication. If we do so, there is no need to introduce any special objects in our ontology; *kodomo* is not a singular predicate that denotes each of some 'plural objects' but a number-neutral predicate that may be true of a number of children as well as a single child. Thus, it seems that plural logic provides a desirable framework for a semantic account of Japanese.

There is a question, however, we must settle before we can apply plural logic to Japanese expressions. Plural logic is applicable only to countable predicates, not to non-countable predicates. Consider the following sentence:

(2) Mizu   ga koboreta.
    water   NOM   spilled
    'Water spilled.'

Mizu (water) does not refer to a single countable object or a number of countable objects. Like the English 'water', it is a mass noun. Plural logic by itself does not give us any hint about how to handle such non-countable expressions.

In order to apply plural logic to (1), for example, we should first justify the assumption that *kodomo* in (1), unlike *mizu* in (2), is a countable predicate. But it has been claimed for several reasons that there is no mass/count distinction in Japanese. If this is a plausible claim, we should give up the hope that plural logic gives us a key to the semantics of Japanese.

Three sorts of reasons have been given for denying the mass/count distinction for Japanese nouns:

i.   As Japanese has no singular/plural distinction and does not have an indefinite article, there is no way of telling the difference between nouns like *kodomo* (child/children) and *mizu* (water) without invoking their meaning.

ii. In Japanese, the same quantifier expression (e.g., *takusan* 'many, much') are used to express count and mass quantification; for example, *takusan no kodomo* means 'many children', and *takusan no mizu* means 'much water'.

iii. In Japanese, usually numerals cannot modify nouns without the help of numeral suffixes (NumSuf).[8] Thus, the Japanese counterpart 'three children', for example, is

(3) san   nin   no   kodomo
     three   NumSuf   GEN   child(ren)
     'three children'

and this has just the same syntactic form as the Japanese expression that means 'three cans of petroleum'.

(4) san   kan   no   sekiyu
     three   NumSuf   GEN   petroleum
     'three cans of petroleum'

Thus, even when you wish to assign a number to countable objects (e.g., children), you should use the construction of the form shared by expressions that specify quantities of mass objects:

(*) Numeral + NumSuf + *no* + Noun.

I think the last one of these three reasons is the most important. Still it does not give a good reason to deny the existence of a mass/count distinction for Japanese.

Thesis (ii) is not correct.[9] Not all Japanese quantifier expressions can serve as both count and mass quantifiers. There is an important class of Japanese quantifier expressions that are constructed with the help of so-called indeterminate phrases such as *dare* (who), *dore* (which), and *dono* N (which N). These are applicable only

to count nouns. Moreover, even among quantity nouns, which include *takusan*, mentioned above, *tasuu* (many) and *shousuu* (a few) are used only for count quantification, whereas *tairyou* (huge amount) and *shouryou* (small amount) are used only for mass quantification.

As for (i), although the existence of plural forms and an indefinite article is crucial for distinguishing count nouns from mass nouns in English, there may be a totally different way to tell the former from the latter in other languages. And I will argue that the kinds of numeral suffixes matching Japanese nouns in instances of (*) mentioned in (iii) yield criteria for distinguishing Japanese count nouns from mass nouns.

This is the reason (iii) is important, although many scholars have cited it as evidence against the existence of a mass/count distinction in Japanese. It provides a clue to the mass/count distinction in Japanese. Though (3) and (4) apparently have a common form, there exists a big difference between them, because the numeral suffixes in them are of different kinds.

Lisa Cheng and Rint Sybesma argue that Chinese has two kinds of classifiers, individual classifiers and non-individual classifiers (massifiers), and that this fact shows the existence of mass/count distinction in Chinese (Cheng and Sybesma, 1998). Similarly, I am going to argue that the existence of different kinds of classifiers, or as I call them, 'numeral suffixes', in Japanese shows that mass/count distinction exists also in Japanese.

But my account of Japanese numeral suffixes differs from their account of Chinese classifiers in two important respects. First, I distinguish three kinds of Japanese numeral suffixes, not two. Second, although Cheng and Sybesma hold that in Chinese, the mass/count distinction exists only at the level of "the type of classifiers used, not the type of noun",[10] I claim that we can single out a class of count nouns in Japanese by attending to the kind of numeral suffix that goes with them and hence that the mass/count distinction exists among nouns as lexical items.

2   Three kinds of numeral suffixes

I divide Japanese numeral suffixes into three classes.[11]

1   Sortal suffixes (classifiers)

   (A)   for individuals

   nin   人   (for persons).
   tou   頭   (for big animals).
   hon   本   (for stick-like objects).
   mai   枚   (for sheet-like objects).
                  . . .

   (B)   for pluralities of individuals

   kumi   組   (for sets or groups of individuals).
   soku   足   (for pairs of footwear).

2   Unit-forming suffixes

   (A)   container type

      bin　　瓶　　　(bottle).
      kan　　缶　　　(can).
      hako　　箱　　　(box).
      pakku　パック　(pack).

   (B)   partitive type

      kire　　切れ　　(slice).
      teki　　滴　　　(drop).
      tsubu　粒　　　(grain).

3   Measure suffixes

      kiro　　　キロ　　　(kilogram or kilometer).
      meetoru　メートル　(meter).
      en　　　円　　　　(yen).
      baito　　バイト　　(byte).

It is relatively clear which numeral suffix belongs to the class of measure suffixes. They are nouns that express unit of measurement; *kiro* is a unit of weight or distance (*kiro* is ambiguous between the two), *meetoru* (meter) is a unit of length, and so on. This class is open ended, and a new measure suffix is added to the language whenever some new measurement system is introduced into society. A good example is *baito* (byte), which became part of common Japanese only in the 1980s.

   Unit-forming suffixes, especially those of the container type, are also open-ended. Container-type suffixes stem from common nouns for some kinds of container and can be used independently without being associated with numerals, as the following example shows.

(5)   Mizu　　ga　　　bin　　　　ni　　　haitte-iru.
     Water　NOM　bottle(s)　LOC　is in
     'Water is in the bottle.'

Just like measure suffixes, a new suffix of this kind will be added when a new form of container becomes popular in society. *Pakku* (pack) is just such a case, and this is shown by the fact that it is written in *katakana*, which is reserved for a word of foreign origin.

   Interestingly, nouns for containers that figure as unit-forming suffixes can even be modified by numeral phrases with numeral suffixes of the first kind. In the following sentence, the numeral phrase *san ko* modifies the preceding container noun *hako*.

(6)   Hako　　　san　　ko　　　　no　　　hon　　　ga　　　aru.
     box(es)　three　NumSuf　GEN　book(s)　NOM　be there
     'There are three boxes of books.'

Unit-forming suffixes of the partitive type may not occur by themselves. But they can be parts of compound nouns such as *kami-kire* (紙切れ, piece of paper), *sui-teki* (水滴, water drop), and *oo-tsubu* (大粒, big grain). These compound nouns can also be modified by numeral phrases.

(7)   Oo-tsubu   san   teki   no   namida   ga   ochita.
      Large grain   three   NumSuf   GEN   tear   NOM   rolled down
      'Literally: Three large drops of tears rolled down.'

It is rather rare for a new partitive type unit-forming suffix to emerge, but it does happen. *Piisu*, a transliteration of English 'piece', is a case in point.

   In contrast to suffixes of the second and third kinds, numeral suffixes of the first kind, which I call 'sortal suffixes' or 'classifiers',[12] form a closed class. They occur only with numerals, either with definite numerals, such as *san nin* (three persons) in (3), or with indefinite numerals, like *suu nin* (a few persons), as in the following sentence.

(8)   Suu   nin   no   gakusei   ga   kita.
      a few   NumSuf   GEN   student(s)   NOM   came
      'A few students came.'

They cannot be a part of a compound noun, unlike unit-forming suffixes. Though *nuno kire* (piece of cloth) and *ko bin* (small bottle) are all right, *nuno mai (intention: for sheets of cloth) or *ko nin (intention: for small persons) cannot be recognized as Japanese.[13]

   Suffixes of this kind should be learned one by one; in contrast to unit-forming suffixes, many of which come from nouns with independent meanings, a learner cannot guess what a given sortal suffix is for.

   Some hold that there is a recent tendency to use the general-purpose suffixes *tsu* (つ) and *ko* (個) for a wide variety of nouns.[14] If this is correct, we may expect that the number of sortal suffixes in use will decrease in the future, for it seems to be extremely rare for a new sortal suffix to emerge. Nevertheless, sortal suffixes are important to Japanese as a language. Although I claim that a sortal suffix by itself does not contribute to the truth condition of a sentence in which it occurs, this does not mean that the suffix makes no contribution to the meaning of the sentence. A sortal suffix sometimes disambiguates homonyms and almost always conveys an important piece of information through its conventional implicature, or so I will argue later.

3   Numeral phrase modifier *bun*

Last section characterizes three kinds of numeral suffixes by invoking more or less syntactical features, such as possible contexts of occurrences and productivity. Kobuchi-Philip claims that there is another syntactic feature that distinguishes sortal suffixes from other kinds of numeral suffixes.[15] She proposes

a criterion that involves the numerical phrase modifier *bun* (worth). Consider (9), with the sortal classifier for person(s) *nin* :

(9) roku nin   *bun*   no   gakusei
     six   NumSuf   worth   GEN   student(s)

Compare this with (10) with the unit-forming suffix *hako* (box) and (11) with the measure suffix *pondo* (pound):

(10) ni   hako   *bun*   no   hon
      two   NumSuf   worth   GEN   book(s)
      'books enough to fill two boxes'

(11) san   pondo   *bun*   no   niku
      three NumSuf   worth   GEN   meat
      'meat that amounts to three pounds'

Kobuchi-Philip holds that (9) is ungrammatical, in contrast to (10) and (11), and that this gives us a criterion for distinguishing sortal suffixes from other numeral suffixes.

In evaluating Kobuchi-Philip's claim, we should note that there are two different constructions involving numeral noun phrases and the modifier *bun*. They are

(α)   Num + NumSuf + *bun* + *no* + N

and

(β)   N′ + Num + NumSuf + *bun* + *no* + N,

where N and N′ are common nouns.

As N′ may be dropped in the construction (β) if it is clear from the context, it sometimes happens that an expression is ambiguous whether it is an instance of (α) or (β). In fact, though (9)–(11) seem to be of form (α), all of them can be interpreted as having form (β) with some contextually given N′. Take (9). If you are trying to figure out how many teachers are necessary to teach a certain group of students, you might use (9) to mean 'students that require six teachers to teach'. Although it is a little more difficult to come up with a suitable context, it is possible to interpret (10) or (11) to be of form (β), not (α). For example, the easiest way to think of (10) as an instance of (β) is to interpret it to mean 'books whose monetary value is equal to that of two boxes of something'. A similar interpretation works for (11), too.

If (9)–(11) are thought to exhibit construction (β), then all of them are grammatical and may be meaningfully interpreted. If we think that (9)–(11) exhibit the construction (α), then it is clear that (10) and (11) are grammatical, while (9) is not. Hence, Kobuchi-Philip's claim is correct, and we may single out sortal classifiers among numeral suffixes by her criterion, as long as we are sure that we are concerned with the construction (α).

Considering the use of *bun* also helps to distinguish between the unit-forming numeral suffixes and the measure suffixes. This time, our consideration is semantic in character, because it is concerned with what entailment each kind of numeral suffixes has. Before going into this, it is necessary to look at the different ways a phrase of the form

> Numeral + NumSuf

is positioned with respect to the noun phrase it modifies. It is because the position of a phrase of this form, which I call 'numeral phrase',[16] as well as that followed by *bun* in a sentence, may make a difference in the way it should be interpreted.

A numeral phrase can occur in three different positions in a sentence. The constructions involving a numeral phrase can be classified according to the position of its occurrence in a sentence.

In the following, let Q be a numeral phrase, N a common noun that Q modifies, and cp a case particle *ga* (NOM) or *o* (ACC). There are three different ways Q may occur in a sentence. I list them, with one example sentence for each. They all mean that three students came.

(I)   'Q *no* N' type

(12)   San   nin   no   gakusei   ga   kita.
       three   NumSuf   GEN   student(s)   NOM   came

(II)   'N Q' type

(13)   Gakusei   san   nin   ga   kita.
       student(s) three   NumSuf   NOM   came

(III)   'N cp Q' type, or 'Q N cp' type

(14)   Gakusei   ga   san   nin   kita.
       student(s) NOM   three   NumSuf   came

(15)   San   nin   gakusei   ga   kita.
       three   NumSuf   student(s)   NOM   came

I will mostly work with type (III) occurrences, because here we can most clearly see that sortal suffixes (classifiers) differ from the other two kinds of numeral suffixes.

4   Individuated and non-individuated reference of noun occurrences

Unlike the mass/count distinction, the distinction between individuated and non-individuated references is supposed to apply to particular occurrences of nouns, not nouns as lexical items. An occurrence of a noun N in a context has an individuated reference if its extension in the context of its use is given as consisting of single Ns; in other words, questions like the following should be answerable in principle:

> What is it to be one N?
> When is one N the same as another N?

If an occurrence of N has an individuated reference, N has an individuated domain. By contrast, an occurrence of a noun N in a context has a non-individuated reference when its extension in the context of its use is given only as those to which N applies; the only question that is supposed to be answerable is

Is/are this/these N or not?

If an occurrence of N has a non-individuated reference, N need not have an individuated domain; it may have an individuated domain if N is a noun like *hon* [book(s)], or it may not have if N is a noun like *mizu* (water). Let us consider the following sentences:

(16) Hon   ga   san   satsu   aru.
      book(s)   NOM   three   NumSuf   be there
      'There are three books.'

(17) Hon   ga   san   hako   aru.
      book(s)   NOM   three   NumSuf (box)   be there
      'There are three boxes of books.'

(18) Hon   ga   san   kiro   aru.
      book(s)   NOM   three   NumSuf (kg)   be there
      'There are three kg of books.'

Satsu in (16) is a sortal suffix for book-like objects, *hako* in (17) is a unit-forming suffix, and *kiro* in (18) is a measure suffix.

There is no need to know the exact number of individual books to decide whether (17) or (18) is true; in the case of (17), you only need to know that each box contains *hon*, namely a book or books, and in the case of (18), you only need to know that what weighs 3 kg are *hon*, that is, a book or books. Thus, in the case of (17) and (18), if you know whether *hon* applies to a given object or objects, it is enough to decide their truth values. By contrast, in order to know the truth value of (16), you have to know how many books there are, and this requires you to know which object constitutes a single book. In short, the occurrence of *hon* in (16) is individuated, while it is not so in (17) and (18).

In short, if you need to know what it is to be one N in order to understand a sentence in which N occurs, its occurrence has an individuated reference; otherwise, it has a non-individuated reference. This characterization, however, is given in English, and, if N is a Japanese common noun, this does not work, because Japanese expressions corresponding to 'one N' would be nothing but gibberish. In general, a numeral cannot come immediately before a noun in Japanese, and for that reason, we don't have a simple formula like 'one N'. Although there is a way to state the distinction directly for a Japanese noun, we will be able to explain it only after we have developed some relevant material. For the time being, I should ask you to tolerate the present explanation given in English.

The phrase 'Q *bun*' can modify a noun N only when N has a non-individuated reference. This is also the case with a noun-involving *bun* phrase 'N´ Q *bun*' like *gakusei san nin bun* (just enough for three students).

If Q has a unit-forming or a measure suffix, then N which Q applies always has a non-individuated reference. Hence, the occurrences of N in S and S(*bun*) may have the same non-individuated reference.

But if Q has a sortal suffix, the occurrence of N in S must have an individuated reference, whereas in S(*bun*), it must have a non-individuated reference because 'Q *bun*' can only modify a noun with a non-individuated reference. There are two possibilities: either (1) S(*bun*) with N does not make sense because the occurrence of N has an individuated reference, or (2) the occurrence of N in S(*bun*) is turned into that of a non-individuated reference. The latter is what is achieved by a noun-involving *bun* phrase that occurs in construction (β). Consider the following expressions.

(19)   gakusei   san   nin   *bun*   no   kyoukasho
       student(s)   three   NumSuf   worth   GEN   textbook(s)
       'textbooks that are just enough for three students'

(20)   hon   san   hako   *bun*   no   omosa
       book(s)   three   NumSuf   worth   GEN   weight
       'the weight equal to three boxes of books'

(21)   ringo   ni-hyaku   guramu   *bun*   no   karorii
       apple(s)   two hundred NumSuf   worth   GEN   calorie
       'the calorie equal to 200g of apple'

A noun-involving *bun* phrase can modify a noun N only when N has a non-individuated reference, but the noun N' that is a part of the modifying phrase may have an individuated reference as well as a non-individuated one. This means that Q may have a unit-forming or measure suffix as well as a sortal one. In the above examples, (19) has a sortal suffix, (20) a unit-forming one, and (21) a measure one.

5   A simple test for identifying different kinds of numeral suffixes

Now I would like to present a test to see which kind a given numeral suffix belongs to. Let S be a sentence of the form

Noun + *ga* + Num + NumSuf + *aru*/*iru*.[17]

and S(*bun*) a sentence that is just like S except that it has *bun* right after a numeral suffix that occurs in S. Hence, S(*bun*) is of the form

Noun + *ga* + Num + NumSuf + *bun* + *aru*/*iru*.

You may recognize that S has a type (III) construction, more specifically, an 'N cp Q'–type construction. For example, if (22) is S, then S(*bun*) is (22[bun]).

(22)   Ringo   ga   ni-hyaku   guramu   aru.
       apple(s)   NOM   two hundred   NumSuf   be there
       'There are two hundred grams of apple.'

(22^*bun*)   Ringo   ga   ni-hyaku   guramu   *bun*   aru.
      apple(s)   NOM   two hundred   NumSuf   worth   be there
      'There is apple that weighs two hundred grams in all.'

It must be noted that in some contexts, (22^*bun*) may be an instance of a different construction that is similar to (β) in section 3.

    N + *ga* + N′ + Num + NumSuf + *bun* + *aru*/*iru*,

meaning that there are apples which are equal in worth with 200 grams of something that is specified in the context. We distinguish the two interpretations of (22^*bun*) as (α) and (β), just as we did in section 3.

    I will examine for each kind of numeral suffix how S and S(*bun*) are logically related to each other. My claim is that each kind of suffix gives rise to a specific entailment pattern.

5.1   Unit-forming suffixes

I start with unit-forming suffixes. Consider the following pair of sentences.

(23)   Ringo   ga   san   hako   aru.
      apple(s)   NOM   three   NumSuf (box)   be there
      'There are three boxes of apples.'

(23^*bun*)   Ringo   ga   san   hako   *bun*   aru.
      apple(s)   NOM   three   NumSuf (box)   worth   be there
      'There are apples that are enough to fill three boxes.'

(23) is an instance of an S of the specified form with the unit-forming suffix *hako*, and (23^*bun*) is the *bun*-inserted variant of S for this S, namely S(*bun*). As the English translation makes clear, (23) entails the existence of three boxes as containers of apples, while there is no such entailment with (23^*bun*), provided that (23^*bun*) is not construed as (β) and there is no hidden occurrence of another noun phrase before *san hako*. Hence, under this assumption, (23^*bun*) does not entail (23). The converse entailment, however, holds. That is, if there are three boxes of apples, then there are apples which are enough to fill three boxes. If (23^*bun*) is construed as (β), it is obvious that there is no entailment in this direction, either.

    Now, let us consider the case of a partitive suffix.

(24)   Ringo   ga   san   kire   aru.
      apple(s)   NOM   three   NumSuf (slice)   be there
      'There are three slices of apple.'

(24^*bun*)   Ringo   ga   san   kire   *bun*   aru.
      apple(s)   NOM   three   NumSuf (slice)   worth   be there
      'There is enough apple for three slices.'

Suppose that (24^*bun*) is construed as (α), not (β). Then, it is obvious that (24) entails (24^*bun*); if (24) is true, then how can (24^*bun*) be false? Does (24^*bun*) entail (24)? The

answer is 'no': for (24) to be true, there must be actually three separate slices of apple, but (24^{bun}) does not imply that. If (24^{bun}) is construed as (β), then there is no entailment between (24) and (24^{bun}) in either direction.

Thus, we can conclude that the following holds for any unit-forming suffix π and any common noun N.

> If S is a sentence of the specified form with a unit-forming suffix π and a common noun N, then S entails S(*bun*), but S(*bun*) does not entail S.

5.2   *Measure suffixes*

Let us turn to measure suffixes. This time, consider the following pair of sentences.

(25)   Ringo   ga   ni-hyaku   guramu   aru.
       apple(s)   NOM   two hundred   NumSuf (gram)   be there
       'There are two hundred grams of apples.'

(25^{bun})   Ringo   ga   ni-hyaku   guramu   *bun*   aru.
       apple(s)   NOM   two hundred   NumSuf (gram)   worth   be there
       'There are apples that amount to two hundred grams.'

How are (25) and (25^{bun}) logically related to each other? There seems to be no difference between them in truth condition; if (25) is true, then (25^{bun}) must also be true and vice versa. The same seems to hold with other measure suffixes listed in §2, such as *kiro* (キロ, either kilogram or kilometer) and *en* (円, yen).

It is essential here that a noun phrase in S not be of type (I) of §3. If S had a noun phrase of type (I), S and S(*bun*) would not be equivalent. To see this, consider the following pair of sentences.

(26)   Ni-hyaku   guramu   no   ringo   ga   aru.
       two hundred   NumSuf (gram)   GEN   apple(s)   NOM   be there
       'There are two hundred grams of apples, or There is/are an apple/apples that weigh(s) two hundred grams each.'

(26^{bun})   Ni-hyaku   guramu   *bun*   no   ringo   ga   aru.
       two hundred   NumSuf (gram)   worth   GEN   apple(s)   NOM   be there
       'There are apples that amount to two hundred grams.'

As the English translation of (26) shows, (26) is ambiguous between two readings. (26) under the first reading is equivalent to (26^{bun}), but (26) under the second reading is not. According to this reading, there is an apple which weighs two hundred grams or there are apples each of which weighs two hundred grams. Hence, if there are more than one apple of two hundred grams, then (26) is true, while (26^{bun}) is false. There is no ambiguity in (25) which is similar to (26). In a sentence of type (III), if a noun occurs with a measure or unit-forming suffix, it always has a non-individuated reference.

It is true that we could have chosen S with a noun phrase of type (II) such as the following.

(27) Ringo   ni-hyaku   guramu   ga   aru.
      apple(s)   two hundred   NumSuf (gram)   NOM   be there
      'There are two hundred grams of apples.'

There is no ambiguity in (27), and it is equivalent to its *bun*-inserted variant. I have chosen the type (III) construction, because it is suitable for all sorts of numeral noun phrases and does not yield sentences that sound awkward, while some specific cases of the type (II) sound awkward.

Let us summarize our result for measure suffixes.

> If S is a sentence of the specified form with a measure suffix π and a common noun N, then S and S(*bun*) are logically equivalent.

It should be added that, just as in the case of unit-forming suffixes, if (25^{bun}) is construed as an instance of (β), then there is no entailment between (25) and (25^{bun}) in either direction.

5.3   Sortal suffixes

Finally, we consider the case of sortal suffixes, or classifiers. You might expect that this case must be obvious, because I agree with Kobuchi-Philip in holding that *bun* cannot modify sortal suffixes. The situation is not so simple, because of the existence of a class of nouns with thing/stuff ambiguity. Such a noun sometimes refers to a number of individuals (including just one individual) and sometimes to the stuff that constitutes (parts of) such individuals. Examples are *ringo* (apple), *tamago* (egg), *maguro* (tuna), and *matsu* (pine). We may call them 'nouns of thing/stuff ambiguity'. In most cases, they are names of things found in nature and variously processed by us for our convenience, ~~namely~~ for our food, clothes, furniture, and so on. You will find many examples of these in your home. If a noun occurring in S has a thing/stuff ambiguity, then S(*bun*), the *bun*-inserted variant of S, makes perfect sense; this seems to be impossible if *bun* cannot modify sortal suffixes without resulting in ungrammaticality.

An explanation can be sought in the very fact that a combination of a sortal suffix with *bun* results in ungrammaticality; if you encounter such a combination, you will try to make sense of it and find a suitable interpretation; such an interpretation can be found in most cases, because it can be construed as an instance of the construction (β), not (α). In the cases of unit-forming or measure suffixes, combinations of numeral suffixes and *bun* make sense as they are, and it is not necessary to seek another interpretation unless there is a special reason for doing so in the context.

We are going to see how such an alternative interpretation is sought for combinations of sortal suffixes and *bun*, first for nouns without thing/stuff ambiguity and then for nouns with thing/stuff ambiguity.

(a) Here is an example of S with a noun that has no thing/stuff ambiguity.

(28) Koin   ga   san   ko   aru.
      coin(s)   NOM   three   NumSuf   be there
      'There are three coins.'

(28^{bun})   Koin   ga   san   ko   *bun*   aru.
          coin(s)   NOM   three   NumSuf   worth   be there

If we construe (28^{bun}) as an instance of the construction (α), it is ungrammatical. However, (28^{bun}) will not be judged ungrammatical in most cases; instead, it will be regarded as an instance of (β) and interpreted as saying that there are coins which are enough for some three things, because the numeral suffix *ko* is used for individual things in general. What these three things are should be determined from the context of the utterance; maybe there are enough coins to fill three piggy banks or to buy three rolls.

In this example, it is easy to find a suitable interpretation for a combination of a sortal suffix and *bun*, because the sortal suffix in question is a general-purpose one, namely *ko*.[18] But if we have a more specialized classifier, then it will not be so easy to find an interpretation. Consider the following.

(29)   Ushi   ga   go   tou   iru.
      cow(s)   NOM   five   NumSuf   be there
      'There are five cows.'

(29^{bun})   Ushi   ga   go   tou   *bun*   iru.
          cow(s)   NOM   five   NumSuf   worth   be there

The classifier *tou* is used for big animals like cows and horses. In order to make sense of (29^{bun}), we have to interpret it as an instance of the (β) construction and find some big animals such that the cow or cows given in the context are equal in worth in a certain way with five of them. Though it is not impossible to find such an interpretation, it is a little difficult to imagine the contexts in which the utterance of (29^{bun}) is natural.

As it is clear that there is no logical entailment in either direction between (28) and (28^{bun}), or, if (29^{bun}) makes sense, between (29) and (29^{bun}) either, we may say the following.

> If S is a sentence of the specified form with a sortal suffix π and a common noun N that does not have thing/stuff ambiguity, then either (i) S(*bun*) does not make sense, or (ii) no entailment holds between S and S(*bun*).

(b) Now, consider the sentences like (28) and (28^{bun}), which have *tamago* (egg) instead of *koin* (coin).

(30)   Tamago   ga   san   ko   aru.
      egg(s)   NOM   three   NumSuf   be there
      'There are three eggs.'

(30^{bun})   Tamago   ga   san   ko   *bun*   aru.
          egg(s)   NOM   three   NumSuf   worth   be there
          'There is egg which amounts to (the edible parts of) three individual eggs.'

This time, there is no difficulty in understanding what (30^{bun}) says. Anybody who hears (30^{bun}) will imagine a bowl into which three eggs are broken. Moreover, (30)

entails (30^{bun}); if there are three individual eggs, it is also true that there is some egg stuff which amounts to (the edible parts of) three individual eggs.

It is worth noticing that there is another reading of (30^{bun}). According to it, *san ko* (three things) does not refer to three eggs, but some other three things that can be determined from the context of the utterance. If these three things are cakes, (30^{bun}) says that there is/are enough egg/eggs to make three pieces of cake. If (30^{bun}) is read in this way, it is not entailed by (30).

It is clear that in the latter reading, (30^{bun}) is construed as an instance of the construction (β) just as it was in the case of (31). I claim that the former reading is also an instance of (β).

In general, if N is a noun having thing/stuff ambiguity, then the sentence S(*bun*), that is,

$$N + ga + Q + bun + aru$$

is most naturally interpreted as an abbreviated form of

$$N^{stuff} + ga + N^{thing} + Q + bun + aru.$$

Thus, the natural interpretation of (30^{bun}) is to read it as

(31) Tamago^{stuff} ga   tamago^{thing} san   ko   *bun*   aru.
      egg stuff   NOM   individual egg(s)   three   NumSuf   worth   be there

Clearly, this is an instance of (β), and it means that there is egg stuff which amounts to (the edible parts of) three individual eggs.

If S has a noun that has thing/stuff ambiguity, its *bun*-inserted variant S(*bun*) will be naturally interpreted as an instance of (β) and read like (31). This is not the only interpretation, as we saw in the case of (30^{bun}), but it is always available for a noun with thing/stuff ambiguity. And in this interpretation, S entails S(*bun*) because the stuff denoted by the noun occurring in S constitutes the individuals denoted by the same noun.

5.4   A simple test

Finally, let us put together all the considerations discussed above. Let N be a common noun, ν a numeral, π a numeral suffix, and S a sentence of the form

$$N + ga + \nu + \pi + aru/iru$$

Further suppose that S(*bun*) is a sentence that results from S by inserting *bun* immediately after π. If we can be sure that S(*bun*) is not an instance of (β), the three kinds of numeral suffixes are distinguished by the following properties.

1   If it is sortal, then S(*bun*) does not make sense.
2   If it is unit-forming, then S entails S(*bun*) but not vice versa.
3   If it is measure, then S and S(*bun*) are equivalent.

But if S(*bun*) can be interpreted as an instance of (β), then there is no such property which distinguishes between the three kinds. In particular, if N that occurs in S is a

noun with thing/stuff ambiguity, an interpretation of S is always available according to which S is an instance of (β). Thus, I propose the following as a simple test for identifying the different kinds of numeral suffixes.

1   If there is a construal of S(*bun*) according to which it does not make sense, then π is sortal.
2   If there is a reading of S(*bun*) according to which S entails S(*bun*) but not vice versa, then π is unit forming.
3   If there is a reading of S(*bun*) according to which S and S(*bun*) are equivalent, then π is measure.

This test is not a decisive one, because the reason entailment between S and S(*bun*) holds might have nothing to do with the meaning of the modifier *bun*; it might be something to do with the meaning of the particular noun N that occurs in S. But I believe this test serves well, at least as a provisional one.

6   Chopsticks, shoes, and twins

Numeral suffixes like *zen* (膳) and *soku* (足) seem to offer counterexamples to our test. Consider (32) and (33), with the *bun*-inserted variants of them:

(32)   Hashi   ga   go   zen   aru.
         chopstick(s) NOM   five   NumSuf   be there
         'There are five sets of chopsticks.'

(32^*bun*)   Hashi   ga   go   zen   *bun*   aru.
         chopstick(s) NOM   five   NumSuf   worth   be there
         'There are chopsticks just enough for five sets.'

(33)   Kutsu   ga   go   soku   aru.
         shoe(s)   NOM   five   NumSuf   be there
         'There are five pairs of shoes.'

(33^*bun*)   Kutsu   ga   go   soku   *bun*   aru.
         shoe(s)   NOM   five   NumSuf   worth   be there
         'There are shoes just enough for five pairs.'

How are (32) and (32^*bun*) or (33) and (33^*bun*) logically related to each other? It is not unreasonable to think that they are logically equivalent; that is, they have the same truth conditions: if one is true, then the other must also be true.

At the same time, it is almost certain that they have different implications; even if they have the same truth condition, there must be some reason why a speaker chooses to utter one and not the other.

In what situation is it natural to utter (32^*bun*) instead of (32)? We may imagine someone who counts a bunch of chopsticks that are alike and utter (32^*bun*) after having found out that there are ten of them. But, do we think (32) is not true in this situation? I suppose not. If there are ten chopsticks that can be paired to each other to form five sets of them, there is no denying that there are five sets of chopsticks.

If we hear the utterance of (32), on the other hand, we just think of five sets of chopsticks that may be different from each other in various ways. Still it is obvious that (32^{bun}) is also true when (32) is true. If (32^{bun}) may sound strange in this situation, it is because (32^{bun}) lacks an extra piece of information that (32) suggests, namely, that the chopsticks are not only enough to form five sets but are already arranged as those sets; hence, uttering (32^{bun}) after (32) violates one of the Gricean maxims of conversation (the Maxim of Quantity). But this does not mean that there is a difference in truth condition between them.

Thus, we must conclude that (32) and (32^{bun}) are logically equivalent. Similarly, we can see that (33) and (33^{bun}) are logically equivalent. Then, in our test, numeral suffixes *zen* and *soku* must be measure ones. Can we accept this conclusion?

Is there any reason to think that *zen* and *soku* are measure suffixes? One might defend this view in the following way. For one thing, we have numeral suffixes for individual chopsticks and individual shoes. For individual chopsticks, we use a sortal suffix *hon* (本), which generally applies to long and narrow things. Similarly, for individual shoes, we use a sortal suffix *ko* (個), which applies to material objects in general. Thus,

> hashi   ichi   zen
> chopstick(s)   one   NumSuf
> 'one set of chopsticks'

consists of

> hashi   ni   hon
> chopstick(s)   two   NumSuf
> 'two chopsticks'

If we already have the sortal suffix *hon* for chopsticks, then why do we need another one for sets of chopsticks? Hence, *zen* must express a measure.

But there is some reason not to regard *zen* and *soku* as measure suffixes. Although *zen* (膳) can be used by itself, not as a part of a numeral noun phrase, in such uses, it is a common noun for a tray of food, not a sort of measure. This is even more obvious with *soku* (足). It never appears outside of a numeral noun phrase.

Now I am going to argue that *zen* and *soku* are sortal suffixes and that the logical equivalence between (32) and (32^{bun}), or (33) and (33^{bun}), does not affect the validity of our test for different kinds of numeral suffixes.

First, let us remember that what we count is not limited to single things; we also count combinations of things like coffee sets or groups of people like couples and families. *Kumi* (組) is a general-purpose sortal suffix for such combinations or pluralities. Thus, we say:

(34)   Fuufu   ga   san   kumi   iru.
       couple(s)   NOM   three   NumSuf   be there
       'There are three couples.'

Kumi is a sortal suffix according to our test, and this is shown by the fact that its *bun*-inserted variant (34^{bun}) does not make sense, or there is no entailment

relation between (34) and (34^{bun}) when the latter is interpreted as an instance of (β).

(34^{bun})	Fuufu	ga	san	kumi	*bun*	iru.
	couple(s)	NOM	three	NumSuf	worth	be there

In what sort of circumstances does an utterance of (34^{bun}) make sense? One possibility is the situation in which we are trying to form three groups of people, and a couple or couples are somehow necessary for them. There can be many cases. It might be stipulated that each of the three groups should have at least two couples. In another, it might be stipulated that each group should have at least one person who belongs to a couple. In the former case, the truth of (34) is not sufficient for that of (34^{bun}). In the latter, (34) may not be true even though (34^{bun}) is true, for the existence of two couples would be enough to satisfy the stipulated condition.

Second, some nouns may refer to either a plurality or its member. *Futago* [twin(s)] is a case in point. Whether a noun refers to a plurality or its member is marked by the presence or absence of plural endings in English. In languages whose nouns do not have singular or plural forms, such as Japanese, however, the number difference must be marked in some other ways. And one of the ways is to use different sortal suffixes, as in the following sentences.

(35)	Futago	ga	san	kumi	iru.
	twin(s)	NOM	three	NumSuf	be there
	'There are three pairs of twins.'				

(36)	Futago	ga	roku	nin	iru.
	twin(s)	NOM	six	NumSuf	be there
	'There are six twins'				

Third, *hashi* [chopstick(s)] and *kutsu* [shoe(s)] are like *futago* [twin(s)] in that they may refer to either a plurality or its member. Hence, considering a parallel example with *futago* [twin(s)] might help us to clarify the situation. Consider the following sentence, which is the *bun*-inserted variant of (35).

(35^{bun})	Futago	ga	san	kumi	*bun*	iru.
	twin(s)	NOM	three	NumSuf	worth	be there

As *futago* may refer either to pairs of twins or individual twins, (35^{bun}) has two interpretations. If *futago* refers to pairs of twins, (35^{bun}) means something similar to what (34^{bun}) means, namely that there are pairs of twins, which are just enough for three combinations of some sort. In this interpretation, it is obvious that (35^{bun}) is construed as an instance of (β). If *futago* refers to individual twins, it means that there are individual twins who are just enough for three combinations of some sort. The obvious candidate for such a combination is a pair of twins; hence, (35^{bun}) means in this interpretation that there are enough individual twins to form three pairs of twins. It is obvious again that this interpretation construes (35^{bun}) as an instance of (β).

We may now see what is responsible for the apparent contradiction. It is not our test but the ambiguity of the noun *futago* [twin(s)]. Those who think that (35) and (35^{bun}) are logically equivalent must interpret *futago* in (35^{bun}) as referring to individual persons, whereas *futago* in (35) refers to pairs. But (35^{bun}) has in fact two readings: the one in which *futago* refers to individual persons and the one in which it refers to twins as pairs, just as *fuufu* [couple(s)] refers to couples as pairs in (34^{bun}). As *futago* in (35) refers to pairs, the second interpretation is the right interpretation for our test, and either (35^{bun}) does not make sense if it is construed as an instance of (α), or it is logically independent from (35) if it is construed as an instance of (β).

Now it must be obvious why our test seemed to fail with *zen* and *soku*. Like *kumi*, they are sortal suffixes that apply to pluralities only. Moreover, the common nouns to which these suffixes are attached can refer to members of a plurality as well as pluralities themselves. *Hashi* [chopstick(s)] may refer to individual chopsticks as well as matched pairs of them; similarly, *kutsu* [shoe(s)] may refer to individual shoes as well as matched pairs of them. Hence, if (32) and (32^{bun}) are thought to be logically equivalent, then the occurrences of *hashi* in two sentences refer to different things; in (32), it refers to matched pairs of chopsticks, while in (32^{bun}), it refers to individual chopsticks. If we do not want to have different references in the two sentences, then we should interpret (32^{bun}) in such a way that *hashi* refers to matched pairs of chopsticks, not individual chopsticks. Then, either (32^{bun}) does not make sense, or it can be construed as an instance of (β); if the latter is the case, it is not difficult to imagine a scenario in which (32) and (32^{bun}) are not equivalent.

The situation is very similar to the case of nouns that have thing/stuff ambiguity. Let N be a noun like *hashi* and *futago* that may refer to pluralities or their members and Q a numeral noun phrase; then the sentence of the form

$$N + ga + Q + bun + aru/iru$$

is most naturally interpreted as an instance of (β) of the form

$$N^{individual} + ga + N^{plural} + Q + bun + aru/iru.$$

Thus, the natural interpretation of (32^{bun}) is

$$Hashi^{individual} \quad ga \quad Hashi^{plural} \quad go \quad zen \quad bun \quad aru,$$

which means there are individual chopsticks that are enough to form five matched pairs of chopsticks.

7 What does a sortal suffix contribute to the meaning of a sentence?

We may conclude that *zen* and *soku* are sortal suffixes. This conclusion does not make our test for different kinds of suffixes invalid. It is a hidden ambiguity in such nouns as *hashi* [chopstick(s)] and *kutsu* [shoe(s)] that makes it seem that our

test gave a wrong verdict. These nouns may refer to either individuals or pluralities of them.

If so, an interesting question arises. As we have noticed, different sortal suffixes are used depending on whether a noun refers to individuals or pluralities. The noun *hashi* requires *hon* when it refers to individual chopsticks, while it requires *zen* when it refers to matched pairs of them. The question is whether a sortal suffix like *hon* and *zen* has a truth conditional content. It is important to address this question, because it is frequently assumed that sortal suffixes, unlike other kinds of numeral suffixes, do not contribute to the truth conditions of sentences in which they occur.

Eric McCready (2012, p. 148) considers the question, with special emphasis on the case of *zen*. And he concludes that "classifiers make a dual contribution to meaning: A conventionally implicated domain restriction, and an individuation of objects for quantification that takes in the truth-conditional domain". I believe that there is an alternative way to construe the function of a sortal suffix; a sortal suffix does not directly contribute to the truth condition of a sentence in which it occurs but helps to disambiguate the noun it attaches to through its conventional implicature. In this view, we do not need to suppose that a sortal suffix (a classifier) has any truth-conditional content. I defend this alternative in this section.

There are some clear cases in which a particular choice of a sortal suffix helps to disambiguate an expression. For example, *kami* might mean either paper (紙) or hair (髪). Although the two senses can be easily distinguished in written Japanese, as different Chinese characters (*kanji*) are used for them, it may be difficult to distinguish them in spoken language in spite of the difference in accent. But if they are accompanied by a sortal suffix as in the following, there will be little chance of misunderstanding them.

(a) kami   san   mai
     paper   three   NumSuf
     'three sheets of paper'

(b) kami   san   bon
     hair   three   NumSuf
     'three hairs'

The case of *kami* is that of pure homonymy; *kami* in the sense of paper and *kami* in the sense of hair are different words that have similar pronunciations by a pure accident. There is no reason to think that there is a word that has a single extension that encompasses both paper and hair and that different sortal suffixes restrict the word to one or the other. When *kami* is used in a sentence, it is used by itself to refer to either paper or hair, and a sortal suffix is chosen accordingly. A sortal suffix indicates which word occurs in a sentence.

The cases of pure homonymy are rare compared to those in which a single word has different senses that are connected to each other in a certain way. Such cases are sometimes called 'paronymy'. In Japanese, a sortal suffix also helps to identify one particular sense among those that are not only associated with one single word

but also related to each other. For example, *ringo*, just like the English 'apple', may mean either fruits or trees. Sometimes it is the accompanying sortal suffix that makes it clear which sense is at issue. In (c), *ringo* refers to fruits, while it refers to trees in (d).

(c)   ringo   san   ko
       apple(s)   three   NumSuf
       'three apples'

(d)   ringo   san   bon
       apple(s)   three   NumSuf
       'three apple trees'

In this case, too, I think it is better to construe an occurrence of *ringo* as referring to either fruits only or trees only rather than referring to both of them indiscriminately; a sortal suffix is, as it were, chosen after the preceding decision about the noun's reference. Consider the following sentence.

(37)   Ringo   ga   tasuu   aru.
        apple(s)   NOM   many   be there
        'There are many apples/apple trees.'

Because of the occurrence of *tasuu* (many), *ringo* in (37) must have an individuated reference.[19] Still, (37) is ambiguous; it may mean that there are many apple fruits, or it may mean that there are many apple trees. But it cannot mean that there are many things that are either apple fruits or apple trees.[20]

The same holds for *hashi* [chopstick(s)] and *kutsu* [shoe(s)]. It is not that a sortal suffix *zen* individuates a domain that is not yet fully individuated but that its presence helps to determine which one of the two fully individuated domains is the right one for the occurrence of *hashi* at issue. In general, I think, when a sortal suffix is attached to a noun, the noun has an associated domain that is already fully individuated. A sortal suffix is chosen according to this individuated domain, and it gives the hearer a hint for that domain, which sometimes has the effect of disambiguation.

In order to explain how a sortal suffix can do so, we must be clear about its contribution to the meaning of a sentence in which it occurs. McCready argues quite successfully that the contribution should be a conventional implicature. He invites us to consider the following sentence.[21]

(38) # Otoko   ga   ni   satsu   haittekita.
         man/men   NOM   two   NumSuf   entered

As McCready tells us, this sentence is weird, but not false; instead, it is just inappropriate, because the classifier *satsu* is used for books. In such a case, we may first suspect that it might be a case of presupposition failure. The standard behavior of presuppositions are (i) its failure induces truth value gaps, (ii) escaping from presupposition 'holes' such as negation and modal operators, and (iii) exhibiting

'binding' behavior; ~~namely~~ if a sentence S carries presupposition P, and S′ entails P, then no presupposition is projected in 'If S′, then S'. It is easily seen that the case of a sortal suffix satisfies (i) and (ii) but not (iii). Hence, it cannot be a case of presupposition failures.[22]

It cannot be a case of conversational implicature, either. For one thing, what the sortal suffix *satsu* indicates cannot be canceled.[23]

There is one remaining option, the case of conventional implicature. Our case satisfies all three of its main properties: (i) it is triggered by particular lexical items or constructions, (ii) it is scopeless, and (iii) it cannot be 'bound' by presupposition.[24] Thus, we may say that the 'meaning' of (38) has two components; ~~namely~~

truth-conditional content: that two men entered, and
conventional implicature: that men are book-like objects.

Now we can see that the weirdness of (38) comes from the conventional implicature it has: its falsity makes (38) inappropriate.

All this is very clear, and I am in complete agreement with it. Moreover, I want to claim that, once we recognize the ambiguity in nouns like *hashi* [chopstick(s)] and *kutsu* [shoe(s)], this is enough to explain how sortal suffixes like *zen* and *soku* work, and, *pace* McCready, there is no need to suppose that they "make a dual contribution to meaning".

Consider the sentence

(39) Ringo   ga   go   hon   aru.
      apple(s)   NOM   five   NumSuf   be there

As remarked above, the occurrence of *ringo* must have an individuated domain because of the presence of the sortal suffix *hon*. But *ringo* may mean either fruits or trees. Thus, (39) is ambiguous, at least[25] between

(39a) Ringo^{fruit}   ga   go   hon   aru.

and

(39b) Ringo^{tree}   ga   go   hon   aru.

Because the sortal suffix *hon* is used for long and slender things, (39a) and (39b) have, respectively, the following conventional implicatures.

(CI: 39a) Apple fruits are long and slender things.
(CI: 39b) Apple trees are long and slender things.

(CI: 39a) is obviously false. This means that if the occurrence of *ringo* in (39) is interpreted as in (39a), then (39) will be inappropriate, at least. Hence, we may conclude that (39) should be interpreted as (39b).[26]

Just as the conventional implicature of the sortal suffix *hon* contributes to disambiguate *ringo* [apple(s)], the conventional implicature of *zen* does the same with respect to *hashi* [chopstick(s)]. Consider again (32):

(32)   Hashi   ga   go   zen   aru.
       chopstick(s)   NOM   five   NumSuf   be there

Just as *ringo* is ambiguous about whether it refers to apple fruits or apple trees, *hashi* is ambiguous about whether it refers to individual chopsticks or matched pairs of them. Thus, theoretically, (32) has two readings.

(32a) Hashi^{individual} ga   go   zen   aru.
(32b) Hashi$^{matched\_pair}$ ga   go   zen   aru.

Just as before, each has the following conventional implicatures.

   (CI: 32a) Each chopstick is a pair.
   (CI: 32b) Each pair of matched chopsticks is a pair.

As the former is obviously false and the latter is obviously true, it is immediately apparent that (32b) is the right interpretation.

In this way, the conventional implicature of the sortal suffix *zen* makes it possible to find the individuated domain for *hashi* in (32). We do not need to suppose that the sortal suffix directly operates on a not yet completely individuated domain for *hashi*.

Thus, I conclude that the semantic contribution of a sortal suffix to the meaning of a sentence does not extend to its truth condition but is confined to its conventional implicatures. This does not mean, however, that a sortal suffix's semantic contribution is not important in interpreting a sentence in which it occurs. We have just seen that exactly the opposite is true.

8   Conclusion

Our discussion so far allows us to make three claims:

   I.   We can distinguish a class of sortal suffixes from other kinds of numeral suffixes with a simple test.
   II. A noun with a matching sortal suffix should have an individuated domain.
   III. A sortal suffix does not have truth-conditional content.

If they are true, then they make it possible for us to do two things. First, we can draw the individuated/non-individuated distinction in such a way that uses only the resources available in Japanese. If S is a sentence in which a common noun N occurs, and there is a sortal suffix π that is appropriate for N, then it makes sense to ask what it is that is called

(%)   ichi/hito[27]   π   no   N.
           one   GEN

For example, we can ask what it is that is called

(e) it-   tou   no   ushi,
       one NumSuf (for big animals) GEN   cow

or

(f) hito- ri   no   gakusei.
       one   NumSuf (for persons) GEN   student

By III, we know that sortal suffix π has no truth-conditional content. This means that (%) corresponds to English 'one N' and that (e) and (f) correspond to 'one cow' and 'one student', respectively. Hence, we can go metalinguistic and, instead of asking what it is to be one N, ask what it is called '*ichi/hito π no* N' for any noun N and a sortal suffix π appropriate for N. Thus, we can characterize the individuated/non-individuated reference for an occurrence of a Japanese common noun N in a sentence S in this way: if there is a sortal suffix π appropriate for N, and we need to know what it is to be called '*ichi/hito π no* N' in order to understand S, then the occurrence of N has an individuated reference; otherwise, it has a non-individuated reference. This means that plural logic, which is just an extension of the standard logic, can be applied to those noun occurrences with individuated references.

Second, our results can serve as a basis for singling out count nouns from common nouns in Japanese and regarding the rest of them as non-count nouns. We have been working with a distinction between individuated and non-individuated references. It is a particular occurrence of a noun that has an individuated or non-individuated reference. The distinction can be also drawn among nouns as lexical items. By II and III, the individuation of the domain must be achieved by the modified noun itself. This means that a noun that typically occurs with a sortal suffix has an individuating force by itself. It is the main characteristic of a count noun. Moreover, by I, we can single out a class of such count nouns with a simple test.

However, we cannot define a count noun simply as a common noun that can be modified by a numeral phrase with a sortal suffix. If this were the right definition, then almost all of the Japanese common nouns would be count nouns.

The main reason such a simple definition does not work lies in the existence of sentences like the following.

(40) Biiru   ga   san   bon   aru.
         Beer   NOM   three   NumSuf   be there
         'There are three bottles of beer.'

(41) Jyamu   ga   san   ko   aru.
         Jam   NOM   three   NumSuf   be there
         'There are three cans/jars of jam.'

Though a numeral phrase *san bon* (*san ko*) with the sortal suffix *hon* (*ko*) seems to modify *biiru* (*jyamu*) that immediately precedes it, in reality, it modifies some noun for a container that is implicitly understood in the context, and the occurrence of *biiru* in (40) [*jyamu* in (41)] does not have an individuated reference. Hence, such cases should be excluded if we wish to characterize a count noun as a common noun taking a certain kind of numeral phrase.

Moreover, the sortal suffix *tsu*, which is called a 'general classifier' along with *ko*, which occurs in (41), can be used with a wide variety of common nouns; some of its occurrences cannot be regarded as having an individuated reference. We may argue that the 'general classifier' *tsu* is sometimes used as a container suffix like *hon/bon* and *ko* and that the noun occurrences that are modified by such uses of *tsu* do not have an individuated reference.

Hence, I propose the following as a characterization of a count noun in Japanese.

A common noun N is a count noun if and only if N can be modified by a numeral noun phrase with a sortal suffix that is not used as a container suffix.

Notes

1 I gave two talks that were based on previous versions of this chapter: one at Workshop on the Semantics of Nouns, Quantifiers, and Classifiers, held at Kyung Hee University, Seoul, on July 18th of 2015, and another at Peking University, Beijing, on September 15th of 2015. On both occasions, I learned much from comments and questions from the audience. I thank the audiences of the talks. In particular, I would like to thank Professor Byeong-uk Yi of the University of Toronto for organizing the wonderful workshop and Professor Chen Bo of Peking University for inviting me to give the talk. I thank Professor Yi also for detailed comments and discussions, to which the present version owes a great deal.

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3 (McKay, 2006), (Oliver and Smiley, 2001), (Oliver and Smiley, 2013), (Yi, 1999), (Yi, 2005), and (Yi, 2006).

4 Here is a list of abbreviations used in this article. NOM: nominative, GEN: genitive, ACC: accusative, LOC: locative, NumSuf: numeral suffix.

5 The occurrence of *kodomo* here might be a definite one as well. Nothing depends on whether *kodomo* is definite or indefinite, however, as far as the point in discussion is concerned.

6 See, for example, (Landman, 2000), (Lasersohn, 1996), and (Schwarzschild, 1996).

7 See the works cited in endnote 3.

8 When a definite collection of individuals is intended, a numeral can directly modify a noun without any numeral suffix, as is shown by *san baka* (three fools), *roku daigaku* (six universities), and *shichi kenjin* (seven sages).

9 Also see (Kobuchi-Philip, 2011, pp. 306–309).

10 (Cheng and Sybesma, 1998, sec. 2.3).

11 There are at least two Japanese terms for numeral suffixes. Masuoka and Takubo use *jyo-suu-ji* (助数辞) in (Masuoka and Takubo, 1993), while Iida Asako uses *jyo-suu-shi* (助数詞) in (Iida, 2004) and (Iida, 2005). And scholars use these terms with different extensions. Iida Asako excludes measure suffixes from *jyo-suu-shi*, and Masuoka and Takubo include them among *jyo-suu-ji*. Moreover, they do not explicitly distinguish between sortal and unit-forming suffixes; unit-forming suffixes are listed in (Iida Asako, 2004), but they are not distinguished from sortal ones, while they are not encountered among the examples of *jyo-suu-ji* listed in (Masuoka and Takubo, 1993). For various terminologies for numeral suffixes, see (Yi, 2011).

12 It frequently happens that numeral suffixes in general are called 'classifiers'. But this name is appropriate only for sortal suffixes; hence, I use 'classifiers' only for them.

13 (Cheng and Sybesma, 1998) make a similar observation about Chinese classifiers (sec. 2.2).

14 See, for example (Iida Asako, 2005, p. 36). But see (Onodera, 2014) for a different view.

15 See example (46a) of (Kobuchi-Philip, 2011). (Watanabe, 2006) also contains the claim that *bun* cannot co-occur with a classifier; see his example sentence (40).

16 In Japanese grammar, an expression of the form 'Numeral + Numeral Suffix' such as *san tou* is regarded as a noun phrase, because (i) like *san tou no ushi* (three cows), it forms a complex noun phrase with a common noun connected by the case particle *no*, which is used for connecting two noun phrases, and (ii) like *san tou da* in the sentence *Ushi wa san tou da* (There are three cows), it forms a predicate with a copula *da*. See (Masuoka and Takubo, 1993, pp. 34–36).

17 Japanese has two verbs, *aru* and *iru*, for expressing existence. Very roughly speaking, *iru* is used for persons and animals, whereas *aru* is used for inanimate things like desks and stones; there is much discussion about the exact distribution of them; for the purpose of this chapter, however, there is no need to go into this controversial issue.

18 Strictly speaking, this is not true; there are things like trees and sheets to which *ko* does not apply. See (Iida Asako, 2004, pp. 345f.) and (Iida Asako, 2005, Ch. 4).

19 If *tasuu* (many) is replaced by *takusan* (many, much), then *ringo* may be used in its stuff sense as well; hence, the resulting sentence would be ambiguous in four ways, for *ringo* may refer to apple wood as well as a kind.

20 Pelletier (2012) suggests that every noun has one comprehensive domain that includes any kind of things it may refer to. But if it were so, I wonder why (37) could not mean the numerousness of both apple fruits and apple trees. (37) means either there are many apple fruits or there are many apple trees, not both.

21 (McCready, 2009, p. 199) and (McCready, 2012, p. 144). I have changed the number of the example sentences.

22 (McCready, 2009, pp. 199–201) and (McCready, 2012, pp. 144–146).

23 (McCready, 2012, p. 146).

24 (McCready, 2009, pp. 201f). and (McCready, 2012, pp. 146f).

25 There is another possible reading of (39). It is to interpret *hon* as a container suffix. Then (39) will mean something like there are five bottles of apple juice. This reading may be safely ignored here.

26 Even though (39a) is wrong in that its conventional implicature is false, we may make sense of its assertion in some circumstances. For example, if it is found that there are five apple fruits at the place that is relevant to the conversational context, we may suppose that *hon* was just a slip of the tongue and the speaker wanted to say that there were five apple fruits. But, of course, this does not make (39a) appropriate.

27 For numbers less than ten, there are two kinds of numerals in Japanese, native ones and Chinese ones; *hito* and *ichi* are both numerals for one, the former a native one and the latter a Chinese one. Only native ones co-occur with the classifier *tsu*.

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