日本語の強量化子の類型論的分析
A Typological Analysis of Strong Quantifiers in Japanese

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ABSTRACT

　本稿は日本語の強量化子の類型論的分析を行う。Matthewson（2001, 2013）の提案では，強量化子は通言語的に D 量化子（<et,<et,t>> タイプ）と Q 量化子（<e,<et,t>> タイプ）の二種類に分かれる。日本語の強量化子がどちらの種類に分類されるかを明らかにするため，本稿では強量化子と結合する裸名詞と被修飾名詞の統語と意味論的特性を考察し，これらの名詞は e タイプであり，日本語の強量化子は Q 量化子であることを示す。さらに，量化名詞の意味的な振る舞いからもこの分析結果は支持されることを示す。

This paper investigates the typology of Japanese strong quantifiers *subete* 'all' and *hotondo* 'most'. Matthewson (2001, 2013) proposes that strong quantifiers are cross-linguistically categorized into two types: *D-quantifiers* (type <et,<et,t>>) and *Q-quantifiers* (type <e,<et,t>>). To identify which type the Japanese quantifiers are, this paper examines the syntactic and semantic behavior of bare nouns and modified nouns with which the strong quantifiers combine. The examination shows that these nouns are type-e expressions and consequently that the strong quantifiers are Q-quantifiers. Further support comes from a restriction and an availability of certain interpretations associated with quantified nouns: the felicity/infelicity of generic-episodic readings and the possibility of partitive readings.

1. Introduction

This paper explores how quantification is expressed in Japanese. Matthewson (2001, 2013) makes a typological analysis of quantifiers. She points out that strong quantifiers are classified into two types: *D-quantifiers* and *Q-quantifiers*. As in (1a), D-quantifiers such as *every* are in D which combine with a set expression (NP) of type <e,t> such as bare singular nouns. Thus, they are of type <et,<et,t>> as in the traditional Generalized Quantifier theory (Barwise & Cooper, 1981). On the other hand, as in (1b) and (1c), Q-quantifiers such as *all* are in Q and combine with an individual-denoting expression such as (kind-denoting) bare plurals, mass nouns and definite plurals, that is, they are of type <e,<et,t>>.

(1) a. $[_{DP<et,t>} [_{D<et,<et,t>>} \text{every}][_{NP<e,t>} \text{apple}]]$
    b. $[_{QP<et,t>} [_{Q<e,<et,t>>} \text{all}]$
        $[_{DPe} \text{apples}_{kind} / \text{snow}_{mass}]]$
    c. $[_{QP<et,t>} [_{Q<e,<et,t>>} \text{all}]$
        $[_{DPe} \text{the} [_{NP<e,t>} \text{apples}]]]$

In English, it is relatively easier to find syntactic and morphological evidence for the type of quantifiers. D-quantifiers attach to singular count nouns, whereas Q-quantifiers to definite plurals, bare plurals and mass nouns. In contrast, as noted in Matthewson (2013), in bare-argument languages, it is not straightforward to identify which type of quantifier is involved. For example, in Japanese, there is no morphological marker to distinguish singulars from plurals and indefinites from definites. Further, since all the nouns appear as bare, no morphological distinction is made among singular count nouns, plural count nouns and mass nouns.

(2) a. Bill-wa   ringo-o   tabeta.
        Bill-TOP   apple-ACC   ate
        'Bill ate an apple/apples/the apple/the apples.'

b. Bill-wa   pan-o   tabeta.
    Bill-TOP   bread-ACC   ate
    'Bill ate bread/the bread.'

(Yoshida, 2008, p. 422)

To characterize quantifiers in bare-argument languages, we need to look into the syntactic and semantic behavior of nouns to which quantifiers attach and that of quantified nominals. The goal of this paper is to identify the typological status of Japanese strong quantifiers *subete* 'all' and *hotondo* 'most', by examining syntactic and semantic characteristics of two types of nouns and quantified nominals. The examination reveals that these nouns are of type e and hence the strong quantifiers in Japanese are Q-quantifiers. The semantic behavior of quantified nouns also confirms this analysis.

2. Japanese quantifiers

In this section, I analyze the semantic type of strong quantifiers in Japanese, based on the analysis of Matthewson (2001). I will limit my discussion to the case where Japanese strong quantifiers, *subete* 'all' and *hotondo* 'most', come immediately after head nouns and before case makers, as exemplified in (3).

(3) a. gakusei   {subete/hotondo}-ga
        student   {all/most}-NOM
        '{all/most} (of the) students'
    b. hon   {subete/hotondo}-o
        book   {all/most}-ACC
        '{all/most} (of the) books'

To investigate the typology of the quantifiers in Japanese, we need to identify the semantic type of the nominal with which the strong quantifiers combine. If the strong quantifiers are D-quantifiers of type <et,<et,t>>, they combine with the nominal of type <e,t>. If, on the other hand, they are Q-quantifiers of type <e,<et,t>>, they combine with the nominal of

type e. This section considers two types of nouns to which the strong quantifiers attach. We first look at bare nouns and then move on to modified nouns.

2.1 Bare nouns and strong quantifiers

Chierchia (1998a, 1998b) argues that Japanese bare nouns share some properties with English mass nouns. First, both Japanese bare nouns and English mass nouns appear in the argument position by themselves (4). Second, both of them denote kinds (5).

(4) a. Bill   ate   bread.
     b. Bill-wa   pan-o   tabeta.
         Bill-TOP bread-ACC   ate

          (Yoshida, 2008, p. 423)

(5) a. Bread was introduced in Japan in
         1543.
     b. Pan-wa   1543-nen-ni   nihon-ni
         bread-TOP   1543-year-in   Japan-to
         tsutae-rare-ta.
         introduce-be-PAST

          (Yoshida, 2008, p. 424)

These two properties show that Japanese bare nouns are of type e just like English bare plurals and mass nouns. Given these observations, bare nouns in Japanese can attach to Q-quantifiers of type $<e,<et,t>>$. The structure of *hon subete* 'all books' will be the one in (6a). This structure of Japanese quantifiers is similar to the one of English *all* when they attach to mass nouns and kind-denoting nouns, repeated below as (6b).

(6) a. $[_{QP<et,t>} [_{DPe} \text{ hon}] [_{Q<e,<et,t>>} \text{ subete}]]$
     b. $[_{QP<et,t>} [_{Q<e,<et,t>>} \text{ all}]$
         $[_{DPe} \text{ apples}_{kind} / \text{snow}_{mass}]]$

The structural parallelism between the Japanese quantifiers and *all* in English predicts further similarities in terms of the restriction of interpretations. It has been observed that in English, when *all* attaches to bare plurals, it allows generic readings but not episodic readings (Brisson, 1998; Gil, 1995; Partee, 1995). Gil (1995) notes that ''NPs of the form *all* N generally entail a preference for generic contexts…. In [episodic] contexts, a more appropriate construction is provided by NPs of the form *all the* N'' (p.352, fn. 2). This contrast is exemplified in the following examples.[1] Matthewson (2001) points out that the same is true for *most*.

(7) a. All the girls went to the gym.
     b. *All girls went to the gym.

          (Brisson, 1998, p. 7)

(8) a. All desks are brown.
     b. #All pages in this book were torn.

          (Partee, 1995, p. 583)

This is also the case for object NPs.

(9) a. !I talked to all linguists.
     b. I talked to all the linguists.

          (Matthewson, 2001, p. 169)

Matthewson (2001) also shows that even though a relevant context is set up as in (10), *all* + bare plural is infelicitous, whereas *all* + definite plural and *every* + singular count noun are fine.

(10) There were 100 linguists and 100
      philosophers at the party. We asked
      everyone, and we found out that...

     a. Every linguist went to New Zealand
         for Christmas last year.
     b. All of the linguists went to New
         Zealand for Christmas last year.
     c. #All linguists went to New Zealand
         for Christmas last year.

          (Matthewson, 2001, p. 170)

Let us now move on to Japanese. Since Japanese does not have an overt marker for definiteness, the language does not have an overt distinction between the strong quantifiers with a bare plural and with a definite plural. However, given the parallelism of the structure of quantifiers between Japanese and English, we expect that a similar pattern with respect to generic-episodic readings is found in Japanese as well. This prediction is borne out. As in English, bare noun + *subete*/*hotondo* admits generic readings.

(11) a. Watashi-wa   gengogakusha
        I-TOP   linguist
        {subete/hotondo}-o   shoosansuru.
        {all/most}-ACC   admire
        'I admire {all/most} linguists.'
     b. Ringo   {subete/hotondo}-ga
        apple   {all/most}-NOM
        amai.
        sweet
        '{All/Most} apples are sweet.'

In addition, Sauerland and Yatsushiro (2017) point out that the acceptability of bare noun + *subete*/*hotondo* varies across native speakers in episodic contexts as indicated by %.[2]

(12) %John-wa   hon   {subete/
     John-TOP   book   {all/
     hotondo}-o   yonda.
     most}-ACC   read
     'John read {all/most} (the) books.'
                    (partially adopted from Sauerland &
                        Yatsushiro, 2017, p. 12)

I found (12) unnatural and unacceptable. The example sounds as if John read all books in the world. The native speakers I consulted also commented that there is a clear contrast between (11) and (12). In addition, even when a relevant context is set up, the sentence is still infelicitous, though it shows some

improvement as illustrated in (13).

(13) Yesterday, John bought five books and
     two magazines. And today, ...
     #/??John-wa   hon   {subete/
     John-TOP   book   {all/
     hotondo}-o   yonda.
     most}-ACC   read
     'John read {all/most} (the) books.'

All the observations in (11)-(13) reveal that the strong quantifiers with bare nouns in Japanese are equivalent to *all* + bare plural in English. Therefore, the Q-quantifier analysis for the strong quantifiers in Japanese is further supported. Specifically, the strong quantifiers combine with an argumental expression to make a generalized quantifier.

In this subsection, I argued that bare nouns in Japanese are type-e expressions, indicating that the Japanese strong quantifiers are Q-quantifiers of type <e,<et,t>>. The generic-episodic contrast in the quantified nouns corroborates the Q-quantifier analysis. In the next subsection, we will look at the semantic type of modified nouns.

2.2 Modified nouns and strong quantifiers

The question arises whether the quantifiers in Japanese also have the structure like (14). In English, for example, a quantified noun *all the apples* has this structure, in which quantifiers combine with DP headed by a definite article.

(14) $[_{QP<et,t>} \; Q_{<e,<et,t>>} \, [_{DPe} \; D_{<et,e>} \, [_{NP<e,t>} \,]]]$

To see whether a similar structure to (14) holds in Japanese, we need to examine whether the nominal to which the strong quantifiers attach can be definite as in English or specific as in Lillooet Salish as Matthewson argues.

We have seen that in (12), *subete*/*hotondo* 'all/most' is infelicitous in episodic contexts (for some native

speakers). It should be noted that the infelicity in episodic contexts disappears when a noun is modified by a relative clause as demonstrated in (15).

(15) John-wa   [kinou   katta]   hon
     John-TOP   yesterday bought   book
     {subete/hotondo}-o   yonda.
     {all/most}-ACC   read
     'John read {all/most} the books that he
     bought yesterday.'

The same effect is found when a noun is modified by a PP as shown in (16).

(16) John-wa   [tsukue-no-ue-no]   hon
     John-TOP   desk-GEN-top-GEN   book
     {subete/hotondo}-o   yonda.
     {all/most}-ACC   read
     'John read {all/most} the books on the desk.'

What the modifiers in (15) and (16) do is to restrict the domain of the head noun. In (15), for example, the domain of the head noun 'book' is not the entire set of books in the universe, but the set of books that John bought yesterday. Thus, the modifiers make the domain narrower. The quantifiers, then, quantify over elements in that narrowed down domain.

The way of creating generalized quantifiers in Japanese is exactly the same as that for Q-quantifiers in English. Matthewson proposes that the creation of generalized quantifiers involves two steps. The first process is to narrow down the domain of the quantifier from the set denoted by the NP. In English, this is made by the definite determiner. The second process is to quantify over parts of the individual in the narrowed down domain.[3]

Unlike English, Japanese needs a modifier to restrict the domain of quantification. Recall that even though a relevant context is set up, the sentence with a bare noun plus strong quantifier sounds infelicitous, repeated below as (17a). Notice that when a relative clause or a demonstrative is added to specify the books, the sentence becomes felicitous as in (17b).

(17) Yesterday, John bought five books and
     two magazines. And today, ...
  a. #/??John-wa   hon   {subete/
     John-TOP   book   {all/
     hotondo}-o   yonda.
     most}-ACC   read
     'John read {all/most} (the) books.'
  b. John-wa   {kinou   katta/
     John-TOP   {yesterday bought/
     sorera-no}   hon   {subete/
     these-GEN}   book   {all/
     hotondo}-o   yonda.
     most}-ACC   read
     'John read {all/most} of {the books
     he bought yesterday/those books}.'

Though why such difference between English and Japanese arises is not clear, what is crucial here is that modification of a noun contributes to the domain restriction. The strong quantifiers in Japanese may attach to a noun only when the domain of it is sufficiently narrowed down just like the case in English where *all* and *most* combine with definite plurals. Otherwise, the sentence sounds odd in episodic contexts. A natural hypothesis is that the creation of generalized quantifiers in Japanese also proceeds in two steps just like in English: domain narrowing and quantification over elements in the restricted domain.

Following Matthewson, I assume that D is responsible for the domain restriction. The way of creating generalized quantifiers in Japanese, thus, supports the analysis that the strong quantifiers in Japanese are Q-quantifiers and they have the structure in (18).

(18) $[_{QP<et,t>} [_{DPe} [_{NP<e,t>}] D_{<et,e>}] Q_{<e,<et,t>>}]$

I assume that Japanese nouns are of type $<e,t>$ just like

English nouns, adopting Sauerland and Yatsushiro (2017) and Sudo (2016) among others. Following a standard approach (e.g., Heim & Kratzer, 1998), a modifier of a noun is of type <e,t> and it is combined with an NP via Predicate Modification, resulting in an NP of the same type. This modified NP is then combined with D.

For the structure of the strong quantifiers in Japanese in (18), I suggest that D is not occupied with the silent maximality operator which combines with an NP and returns a meaning of type e just like the definite determiner in English as assumed in Sauerland and Yatsushiro (2017). Consider the following example.

(19)   Yesterday, John bought ten books. And today, ...

John-wa	{kinou	katta/
John-TOP	{yesterday	bought/
sorera-no}	hon-o	yonda.
these-GEN	book-ACC	read

'Lit. John read {(the) book(s) he bought yesterday/those books}.'

This example is judged as true, if, for example, John only read three of the books he bought yesterday. Note that this is also the case with the demonstrative (Erlewine & Gould, 2016). That is, the example does not entail that John read all ten books, showing that the modified noun does not denote the maximal element. Thus, modified nouns in Japanese should be treated not as an equivalent of English definite expressions.[4] Instead, I postulate that modified nouns are referential expressions or specific indefinites. Adopting Matthewson's analysis for the strong quantifiers in Lillooet Salish, I assume that D introduces variables over choice functions which derive referential expressions or specific indefinites (Kratzer, 1998). Thus, a choice function of type <et,e> in D applies to NP of type <e,t> and chooses one (singular or plural) individual from the set denoted by

the (modified) NP. These DPs are type-e expressions and they are referential/specific. Given these, (20a) is informally analyzed as (20b) and paraphrased as (20c) (f is a variable over choice functions).

(20)   a.   John-wa   kinou   katta
             John-TOP   yesterday   bought
             hon-o   yonda.
             book-ACC   read
        b.   John read f(book that he bought yesterday)
        c.   John read the book(s) which is/are chosen from the set of book(s) John bought yesterday by the choice function f.

Nouns with a modifier end up with a type-e expression, an appropriate type for a quantifier of type <e,<et,t>>, namely, Q-quantifiers. Thus, the strong quantifiers in Japanese combine with the DP containing a modified noun, generating a generalized quantifier.

We have seen that the Japanese strong quantifiers have the structure in (18). I will add a piece of evidence for the proposed structure. In the analysis of English *all* and *most*, Matthewson examines the partitive constructions and argues that *of* is semantically vacuous. This semantic vacuity analysis accounts for the identical meaning between the partitive and non-partitive constructions (*all of the students* and *all the students*, respectively) and indicates that the partitive and non-partitive constructions are identical in the syntactic and semantic structure. This analysis suggests a possibility that the Japanese quantifiers appeared in the proposed structure will admit partitive interpretations. To see whether this is the case, let us first look at a typical partitive construction in Japanese and its meaning as exemplified in (21). A noun is marked by a genitive case *no* and followed by a quantifier.

(21) John-wa   kinou   katta
     John-TOP   yesterday   bought
     hon-no   {subete/hotondo}-o
     book-GEN   {all/most}-ACC
     yonda.
     read
     'John read {all/most} of the books that
     he bought yesterday.'
                    (Sauerland & Yatsushiro, 2017, p. 1, with
                                    a slight modification)

The interpretational characteristics of the partitive construction is found in *hotondo*. Sauerland and Yatsushiro (2004) observe that the example in (22) allows two partitive readings as shown in (22a) and (22b).

(22) John-wa   kinou   katta
     John-TOP   yesterday   bought
     hon-no   hotondo-o   yomi-oeta.
     book-GEN   most-ACC   read-finished
     a. John has finished reading most
         pages of the book that he bought
         yesterday.
     b. John has finished reading most
         books of the books that he bought
         yesterday.
                    (Sauerland & Yatsushiro, 2004, p. 111,
                                    with a slight modification)

In (22a), it is a single book that is divided. In this case, *hotondo* quantifies over parts of a book, that is, 'pages'. On the other hand, in (22b), a set of books is divided: *hotondo* quantifies over books.

We predict that the proposed structure for the strong quantifiers in Japanese will show the same two partitive readings as the partitive construction in (22) has. This prediction is in fact borne out. Sauerland and Yatsushiro (2004) point out that the non-partitive construction in (23), which is derived from the proposed Q-quantifier structure, allows the two partitive readings.

(23) John-wa   kinou   katta   hon
     John-TOP   yesterday   bought   book
     hotondo-o   yomi-oeta.
     most-ACC   read-finished
                    (Sauerland & Yatsushiro, 2004, p. 111,
                                    with a slight modification)

The example (23) can have the single-book reading as in (22a) and the multiple-book reading as in (22b). This observation supports the current analysis that the strong quantifiers in Japanese are Q-quantifiers and they have the same structure that the ones in English have.

This subsection has looked at the semantic nature of modified nouns, with which the strong quantifiers combine. We have seen that a similar domain narrowing effect seen in English definite plurals is found in modified nouns in Japanese, suggesting that modified nouns denote referential expressions or specific indefinites, that is, they are type-e expressions. Thus, the strong quantifiers in Japanese attach to the nominal of type e and consequently the strong quantifiers are of type <e,<et,t>>, namely, Q-quantifies. Even though Japanese does not have overt morphological makers for definiteness and plurality, the analysis made in this section further supports that the Japanese strong quantifiers are categorized into Q-quantifiers.

3. Conclusion

This paper has examined the typology of the strong quantifiers in Japanese, based on Matthewson (2001, 2013). The investigation of bare nouns and modified nouns with which the strong quantifiers combine shows that they are argumental type. Hence the strong quantifiers in Japanese are of type <e,<et,t>>, namely, Q-quantifiers. The generic-episodic contrast and the availability of partitive readings add support for the

Q-quantifier analysis. In addition, just like in English, the strong quantifiers in Japanese form generalized quantifiers in two-steps: the domain restriction and quantification over the restricted set. In spite of the fact that Japanese does not have an overt marker for definiteness, overt modification leads to the domain restriction. Although we need to wait for future analyses for other bare-argument languages, the paper has shown that Matthewson's typology, specifically, the Q-quantifier analysis, is applicable at least to Japanese.

Acknowledgements

Notes

[1] Each author uses a different mark for infelicity: *, # or !.

[2] Sauerland and Yatsushiro (2017) do not mention the difference in the acceptability between episodic and generic readings.

[3] It is assumed that a similar two-step process is also involved in the case where strong quantifiers combine with bare plurals in English. As assumed in Matthewson (2001), a kind is created out of a property via the $\cap$ operation (Chierchia, 1998b). I assume that kind-readings of Japanese bare nouns are derived in the same manner, though this is a matter of debate.

[4] Fodor and Sag (1982) point out that in English when an indefinite is modified by a relative clause as in (i), it is preferentially interpreted as a referential (specific) expression.

(i) A student in the syntax class who has a Ph.D. in astrophysics cheated on the exam.

Example (i) is understood as about a particular and unique student. In this sense, the indefinite a student behaves just like a proper name, namely, a type-e expression. If we assume that the same is true in Japanese, then modified nouns are of type e, as the current analysis proposes.

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