A Compositional Analysis of Plural Morphemes in Japanese

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1 Introduction

This paper argues that the Japanese plural morpheme takes a silent group noun as its complement, and that an apparent head noun is located in the specifier of the phrase head by the plural morpheme.

As shown in (1), the plural morpheme *-tati* can combine with a proper noun or a common noun, and derives an associative reading or an additive reading.[1] In this paper, I call a noun followed by the plural morpheme a host noun. *Taro* in (1a) and *gakusei* 'student' in (1b) are a host noun. When *-tati* attaches to a proper noun, the associative reading is preferred over the additive one. However, the additive reading is still possible. A common noun with *-tati* does not have such preference, and both readings are equally available.

(1) a. *Taro-**tati**-ga   ki-ta*.
       Taro-PL-NOM   come-PST
       'People named "Taro" came.'   [additive]
       'A group represented by Taro came.'   [associative]
    b. *gakusei-**tati**-ga   ki-ta*.
       student-PL-NOM   come-PST
       'Students came.'   [additive]
       'A group represented by students came.'   [associative]

2 Previous Analyses

It has been assumed that the plural morpheme in Japanese is a functional head above NP. Kurafuji (1999, 2004) argues that the plural morpheme is semantically a definite determiner associated with a pluralizer function. Based on his semantic analysis, Kurafuji assumes that the plural morpheme

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[1] Japanese has other forms of the plural morpheme such as *-ra*. This paper mainly focuses on examples with *-tati* because *-tati* is arguably the unmarked option of the plural morpheme. To the best of my knowledge, there is no crucial difference between *-tati* and other exponents both in syntax and semantics.

is D, which takes an NP as its complement, as shown in (2a). On the other hand, Hirose (2004) argues the plural morpheme can adjoin to an NP or a DP, as in (2b). Under Hirose's analysis, the plural morpheme is not D. As shown in (2c), Ueda & Haraguchi (2008) and Munakata (2012) claim that in addition to D, there is another position for the plural morpheme; Num.

(2) a. Kurafuji (1999, 2004)   b. Hirose (2004)   c. U&H (2008), Munakata (2012)
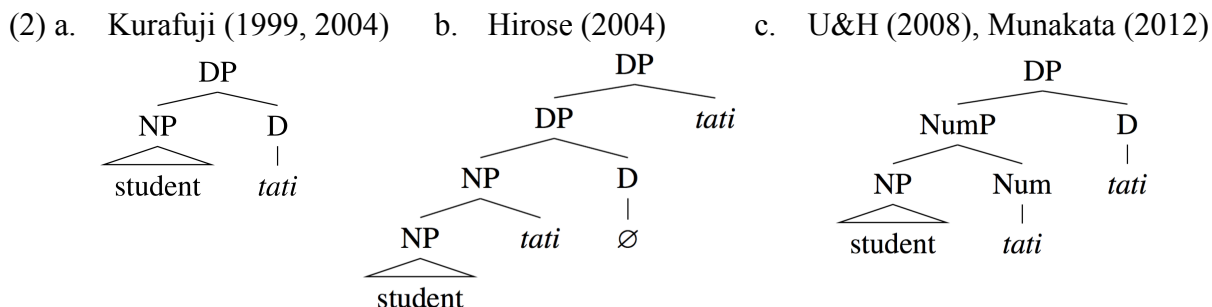
Although these previous analyses are different in their details, they assume that the plural morpheme combines only with a host noun.

As for semantics, Kurafuji (1999, 2004) proposes that the plural morpheme contains the pluralization function PL, which takes an individual variable and the Cooperian property variable P_i as its argument, as shown in (3). In (3a), P_i refers to the most salient property in a given context. To derive an additive interpretation, he assumes that P_i can be λ-bound, as in (3b). He argues that the definiteness of the plural morpheme comes from the σ-operator.

(3) a. $[\![\text{PL}]\!] = \sigma x \, . \, [PL(P_i)(x)]$
    b. $[\![\text{PL}]\!] = \lambda P_i \, . \, \sigma x \, . \, [PL(P_i)(x)]$ (Kurafuji 1999, 2004)

On the other hand, Nakanishi and Tomioka 2004 offers a uniform analysis of the additive reading and the associative reading. The semantic derivation of the subject nouns in (1) is given in (4).

(4) a. $[\![[\textit{Taro-tati}]]\!] = \lambda x \, . \, \lambda Y \, . \, [x \leq_i Y \, \& \, |Y| \geq 2 \, \& \, x \text{ represents } Y](\text{Taro})$
             $= \lambda Y \, . \, [\text{Taro} \leq_i Y \, \& \, |Y| \geq 2 \, \& \, \text{Taro represents } Y]$
    b. $[\![[\textit{gakusei-tati}]]\!] = \lambda x \, . \, \lambda Y \, . \, [x \leq_i Y \, \& \, |Y| \geq 2 \, \& \, x \text{ represents } Y](\text{student}')$
             $= \lambda Y \, . \, [\text{student}' \leq_i Y \, \& \, |Y| \geq 2 \, \& \, \text{student}' \text{ represents } Y]$

In (4), Y is a variable for a contextually relevant group. In (4a), the group is represented by Taro. In (4b), the group Y is represented by the property of being a student, instead of an individual. Under Nakanishi and Tomioka's analysis, the difference between (1a) and (1b) is reduced to a representative characteristic of a contextually defined group. (See also Nakanishi and Ritter 2008 for a similar approach to the plural morpheme.) It is worth noting here that the plural morpheme is not a marker for definiteness under their analysis. We can apply the iota operator or an existential closure operator to (4a,b). For instance, if (4a) is existentially closed, we will obtain an indefinite interpretation of (4a); 'A group represented by Taro.'

3 Proposal

Following Nakanishi and Tomioka 2004, I assume that the main semantic contribution of the plural morpheme is to specify a relationship between a contextually salient group and a representative of that group. In addition, I propose that this semantic content of the plural morpheme is mapped directly to syntactic structure, as shown in (5). Crucially, the plural morpheme first takes a covert plural pronoun as its complement. A host noun is base-generated in the specifier of the phrase headed by the plural morpheme. Of importance here is that a host noun is trapped inside XP, and hence cannot c-command elements outside XP.

(5)

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              XP
            /    \
          DP      X′
         /\      /  \
        /__\    X    pro_PL
        ...     |
               tati
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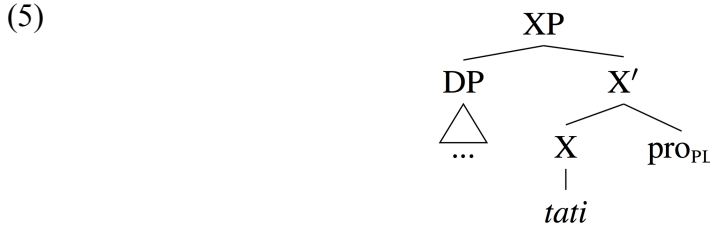
As for the semantics, I propose that the plural morpheme has the denotation in (6a). It takes a covert plural pronoun as its first argument. Here, I assume that a covert plural pronoun is composed of the feature [group] and the feature [def] proposed by Kratzer (2009). A covert plural pronoun denotes the largest plural individual that has a property of being a group, as in (6d).

(6) a. $[\![\text{PL}]\!]^{g, c} = \lambda x \,.\, \lambda y \,.\, \lambda z \,.\, [z \leq x \wedge y \leq_c x]$

   b. $[\![[\text{group}]]\!]^{g, c} = \lambda v \,.\, [\text{group}'(v)(c)]$

   c. $[\![[\text{def}]]\!]^{g,c} = \lambda P_{<e,t>} \,.\, \sigma u \,.\, [P(u)]$

   d. $[\![\text{pro}_{\text{PL}}]\!]^{g, c} = \sigma v \,.\, [\text{group}'(v)(c)]$

   e. $[\![[\textit{tati}\ \text{pro}_{\text{PL}}]]\!]^{g, c} = \lambda y \,.\, \lambda z \,.\, [z \leq \sigma v[\text{group}'(v)(c)] \wedge y \leq_c \sigma v[\text{group}'(v)(c)]]$

In (6), $y \leq_c x$ means that y is a contextually salient subpart of x. I use $\leq_c$ to encode what Nakanishi and Tomioka (2004) expresses with "represents" in (4).

    Let us now consider a case where a proper noun is used as a host noun. As shown in (5), a host noun is base-generated in Spec,XP. (7a) shows the semantic denotation of an example in which *Taro* is interpreted as a proper noun. Here, z is a subpart of a contextually defined group, and Taro is the most salient subpart of the group in the context. This is the associative interpretation of the subject noun in (1a).

(7) a. $[\![[_{\text{XP}} \textit{Taro} [_{\text{X}'} \textit{tati}\ \text{pro}_{\text{PL}}]]]\!]^{g, c} = \lambda z[z \leq [\![\text{pro}_{\text{PL}}]\!]^{g, c} \wedge \text{Taro} \leq_c [\![\text{pro}_{\text{PL}}]\!]^{g, c}]$

   b. $[\![[_{\text{XP}}[[\text{def}]\textit{Taro}] [_{\text{X}'} \textit{tati}\ \text{pro}_{\text{PL}}]]]\!]^{g, c} = \lambda z[z \leq [\![\text{pro}_{\text{PL}}]\!]^{g, c} \wedge \sigma h[\text{Taro}'(h)(c)] \leq_c [\![\text{pro}_{\text{PL}}]\!]^{g, c}]$

If *Taro* is interpreted as a property of being named "Taro," we obtain the additive interpretation, as in (7b). Before merging with the plural morpheme, the property-denoting noun is converted into type *e* by combining with [def]. The plural morpheme *-tati* takes this definite description as its argument. When the referent of σh[Taro′(h)(c)] is equal to a contextually defined group, we obtain a complete additive interpretation (i.e. all members of the group have the property of being named "Taro"). If the referent of σh[Taro′(h)(c)] is a subpart of the group, we obtain an incomplete additive interpretation. Under the incomplete additive interpretation, there could be some individuals who are not named "Taro" in the group, although most of the people in the group are named "Taro."

A similar derivation underlies the plural morpheme with a common noun. I assume that Japanese common nouns can denote a property. Like the additive interpretation of a proper noun, a property denoted by a common noun is converted into type *e* by merging with [def], as in (8).

(8) a. $[\![$ *gakusei* $]\!]^{g,\,c}$ = λh . [student'(h)(c)]
   b. $[\![$ [[def] *gakusei*] $]\!]^{g,\,c}$ = σh . [student'(h)(c)]
   c. $[\![$ [$_{XP}$ [[def] *gakusei*] [$_{X'}$ *tati* pro$_{PL}$]] $]\!]^{g,\,c}$
                    = λz . [z ≤ $[\![$pro$_{PL}]\!]^{g,\,c}$ ∧ σh[student'(h)(c)] ≤$_c$ $[\![$pro$_{PL}]\!]^{g,\,c}$]

When σh[student'(h)(c)] is equal to a contextually defined group, we obtain the complete additive interpretation. If σh[student'(h)(c)] is a subpart of the group, we obtain the incomplete additive interpretation. (9) shows that *gakusei-tati* 'student-PL' allows non-students to be included in a given group. (See Nakanishi and Tomioka 2004 for similar data.) (9) is true in a situation where the relevant group contains non-students as its member.

(9)   [[$_{RC}$ *keikan-ga*   *taiho-sita*] *gakusei*]-**tati**-*no*   *naka-ni-wa*
            police.officer-NOM   arrest-did   student-PL-GEN   inside-LOC-TOP
         zimuin-mo   *mazat-teita*.
         office.worker-also   include-ASP
         'Among the students who a policeman arrested, office workers were also included.'

Crucially, the proposed analysis assumes that if a host noun denotes a property, it must combine with the [def] feature. I suggest that this requirement stems from the semantic content of the plural morpheme. Under the present analysis, the main contribution of the plural morpheme is to specify a subpart relationship between a covert plural pronoun and a host noun. To define a subpart relationship, the compared groups must be definite. There is one piece of evidence for the assumption that a host noun should be definite. As shown in (10a), the plural morpheme cannot combine with the wh-pronoun *dare* 'who.' On the other hand, *doitu* 'which person' can co-occur with the plural morpheme, as in (10b).

(10) a. ** Mary-wa*   *dare*{**-ra**| **-tati**}*-o*   *kirat-teiru*   *no*.
            Mary-TOP   INDET-PL -PL -ACC   hate-ASP   Q
            'Who does Mary hate?'
     b. ? *Mary-wa*   *doitu*-**ra**-*o*   *kirat-teiru*   *no*.
            Mary-TOP   which.person-PL-ACC   hate-ASP   Q
            'Which people does Mary hate?'

The acceptability of (10b) shows that a wh-expression can combine with the plural morpheme. Given this, what is noteworthy about the contrast in (10) is the unacceptability of (10a). The contrast in (10) can be captured by assuming that a host noun must be definite. Of importance here is that *doitu* is a D-linked wh-expression, whereas *dare* is an indeterminate pronoun (Nishigauchi 1990). When the plural morpheme is absent, *doitu* is interpreted as a D-linked *wh*-expression, as shown in (11).

(11)   *Mary-wa*   *doitu-o*   *kirat-teiru*   *no*.
            Mary-TOP   which.person-ACC   hate-ASP   Q
            'Which person does Mary hate?'

Following Shimoyama (2006), I assume that Japanese indeterminate pronouns denote a Hamblin set (Hamblin 1973, Rooth 1985). An indeterminate pronoun cannot be interpreted as a definite set of individuals, and hence cannot be used as a host noun of the plural morpheme. In contrast, *doitu* can function as a host noun because of its D-linked nature.

4 Support

4.1 Determiner Use of the Plural Morpheme

There is support for the proposed analysis. First, only a noun followed by the plural morpheme can be used as a determiner in the sense that it can immediately precede another common noun, as in (12a). Bare nouns do not have this use, as shown in (12b).

> (12) a. *Mary-wa* [{*watasi* | *anata* | *kanozyo* | *John*}*-tati gakusei*]*-o kirat-teiru.*
> Mary-TOP I you she John -PL student-ACC hate-ASP
> Lit. 'Mary hates {I | you | she | John}-PL students.'
>
> b. **Mary-wa* [{*watasi* | *anata* | *kanozyo* | *John*} *gakusei*]*-o kirat-teiru.*
> Mary-TOP I you she John student-ACC hate-ASP
> Lit. 'Mary hates {I | you | she | John} students.'

Under the present analysis, the plural morpheme first combines with a covert plural pronoun, as shown in (5). I propose that the common noun preceded by the plural morpheme in (12a) appears in the complement position of the plural morpheme. In other words, the plural morpheme provides a position for a noun preceded by the plural morpheme. Unlike the determiner use of English plural pronouns, a proper noun can also function as a determiner, in tandem with the plural morpheme, as in (12). Moreover, a common noun can precede another common noun if the first common noun can be interpreted as a subpart of the second noun, as shown in (13a). Crucially, when the order of the two noun phrases is reversed, the resulting sentence is unacceptable, as shown in (13b).

> (13) a. *Mary-wa* [*gakusei-**tati** wakamono*]*-ni sitaw-are-teiru.*
> Mary-TOP student-PL young.person-by respect-PASS-ASP
> Lit. 'Mary is respected by young people like students.'
>
> b. **Mary-wa* [*wakamono-**tati** gakusei*]*-ni sitaw-are-teiru.*
> Mary-TOP young.person-PL student-by respect-PASS-ASP
> Lit. 'Mary is respected by young people like students.'

The proposed analysis can capture the contrast in (13). Intuitively speaking, a group of students can be construed as a subpart of a group of young people because typical specimens of the student-kind will be a young person. However, typical specimens of young people do not have to be a student. The plural morpheme requires a host noun to be smaller than or equal to a contextually salient group. (13a) is acceptable because a group of students can be a subpart of a group of young people. However, since a group of young people is not a subpart of a group of students, (13b) does not satisfy the semantic requirement of the plural morpheme, and hence gives rise to the unacceptability (cf. Gajewski 2002). It may be worth noting that (13b) becomes acceptable if we put a pause between the first noun and the second noun. In that case, the second noun is interpreted like a nominal appositive (cf. Potts 2007). I suggest that under such appositive interpretation, a group of young people and a group of students refer to the same set of individuals. Therefore, the semantic requirement of the plural morpheme is satisfied.

Moreover, the proposed analysis predicts that singular nouns cannot follow the plural morpheme. This is because the plural morpheme semantically requires a plural noun in its complement position. This prediction is borne out, as shown in (14).

(14) * *Mary-wa*   [*gakusei-**tati** John*]-*ni*   *sitaw-are-teiru*.
       Mary-TOP   student-PL   John-by   respect-PASS-ASP
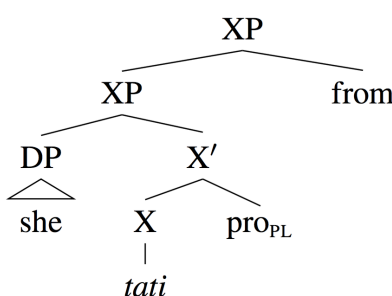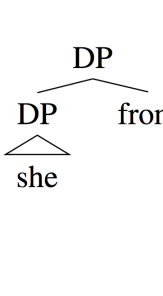   Int. 'Mary is respected by students represented by John.'

Note that unlike (13b), the unacceptability of (14) is not improved by putting a pause between the two nouns. This means that (14) is unacceptable simply because a singular noun cannot appear in the complement position of the plural morpheme.

4.2   Binding Condition C

The second argument for the present analysis comes from Binding Condition C. As shown in (15a), Japanese plural pronouns do not cause a Binding Condition C violation when they are used as a binder. This behavior is not observed with a singular person pronoun, as in (15b).

(15) a.   *kanozyo$_1$-**tati**-kara* [*Mary$_1$-no*   *titioya*]-*ni*   *purezento-o*   *watasi-ta*.
          she-PL-from   Mary-GEN   father-to   present-ACC   give-PST
          'A group represented by her$_1$ gave a present to Mary$_1$'s father.'
     b.   * *kanozyo$_1$-kara*   [*Mary$_1$-no*   *titioya*]-*ni*   *purezento-o*   *watasi-ta*.
          she-from   Mary-GEN   father-to   present-ACC   give-PST
          'She$_1$ gave a present to Mary$_1$'s father.'

Note that the presence of the postposition *-kara*, which is assumed to be a particle, does not have any effect on a Binding Condition C violation, as shown in (15b). The previous analyses of the plural morpheme, which assume that the plural morpheme is also a particle attached to a host noun as in (2), will wrongly predict that (15a) is unacceptable just like (15b). In contrast, the present analysis can capture the contrast in (15). The subject nouns in (15) have the following structures.

(16) a.

Here, I simply assume that *-kara* 'from' in (15) can be ignored with respect to the c-command relationship between a binder and a bindee. In (16a), the pronoun in Spec,XP cannot c-command anything outside XP, and the violation of Binding Condition C is not observed. On the other hand, the pronoun in (16b) does c-command *Mary*, and hence triggers a Binding Condition C violation.

4.3   Bound Variable Readings

Another support for the present analysis comes from the availability of bound pronouns. It has been observed that like 3rd person pronouns, 1st and 2nd person pronouns can also receive a bound

variable interpretation (see Partee 1989, Rullmann 2004, Kratzer 2009). Although non-bound variable reading is relatively salient, the bound variable interpretation of person pronouns is attested in Japanese as well, as shown in (17). (For a bound variable interpretation of Japanese 3rd person pronouns, see Yashima 2015 and references therein.)

(17)   *watasi-dake-ga*   [*watasi-no ronbun*]-*o*   *inyoo-sita.*
        I-only-NOM   I-GEN   paper-ACC   cite-did
        'I cited my paper, but other people didn't.'   [non-bound variable reading]
        'I was the only x such that x cited x's paper.'   [bound variable reading]

Under the bound variable reading, (17) implies that nobody else cited his/her paper. Importantly, the bound variable interpretation is subject to the c-command requirement; only when a semantic binder c-commands a bound pronoun, the resulting sentence receives a bound variable interpretation. For instance, if a semantic binder is embedded in a larger noun phrase, the bound variable interpretation becomes unavailable as in (18a). The intended bound variable reading of (18a) can be observed in (18b), where a semantic binder is used as a major subject.

(18) a. [*watasi-no sensei*]-*dake-ga*   [*watasi-no ronbun*]-*o*   *inyoo-sita.*
          I-GEN   teacher-only-NOM   I-GEN   paper-ACC   cite-did
          'My teacher cited my paper, but other people didn't.' [non-bound variable reading]
          '*I was the only x such that x's teacher cited x's paper.'   [bound variable reading]
     b. *watasi-dake-ga sensei-ga*   [*watasi-no ronbun*]-*o*   *inyoo-sita.*
          I-only-NOM   teacher-NOM   I-GEN   paper-ACC   cite-did
          'My teacher cited my paper, but other people didn't.' [non-bound variable reading]
          'I was the only x such that x's teacher cited x's paper.'   [bound variable reading]

The contrast between (17) and (18a) shows that an antecedent must c-command a bound pronoun to receive a bound variable interpretation. Keeping this in mind, let us now consider a case where a semantic binder is followed by the plural morpheme, as in (19).

(19)   *watasi-**tati**-dake-ga*   [*watasi-no ronbun*]-*o*   *inyoo-sita.*
        I-PL-only-NOM   I-GEN   paper-ACC   cite-did
        'Our group cited my paper, but other people didn't.'   [non-bound variable reading]
        '*I was the only x such that x's group cited x's paper.'   [bound variable reading]

Under the non-bound variable interpretation, (19) is false if there is someone who cited the speaker's paper. Under the bound variable interpretation, however, (19) is still true in the same situation. The bound variable interpretation becomes false only in a situation where there is someone other than the speaker whose group cited his/her paper in context. Crucially, (19) does not receive such interpretation. This means that the plural morpheme blocks a bound variable interpretation. The contrast between (17) and (19) can be captured under the proposed analysis. In (19), the 1st person pronoun is located in Spec,XP, and hence does not c-command a bound pronoun. Given that the bound variable interpretation is possible only when a semantic binder c-commands a bound pronoun, the proposal correctly predicts that the bound variable interpretation is disallowed in (19).

4.4   Associative Plurals in Other Languages

There is another support for the present analysis. It is well-known that Chinese has the plural suffix *-men*, which derives an associative interpretation as in (20a). Importantly, a 3rd person plural pronoun can also derive an associative reading when it follows a proper noun, as shown in (20b).

(20) <u>Chinese</u> (Chao 1968, Iljic 2005)
    a. *Xiǎo   Qiáng-men*   b. *Xiǎo   Qiáng   tamen*
        Xiao   Qiang-PL   Xiao   Qiang   they
        'Xiao Qiang's group'   'Xiao Qiang's group'

Although it is not possible to overtly realize a plural pronoun in Japanese associative plurals, (20b) suggests that we can make use of a plural pronoun to derive an associative reading. Afrikaans also has a similar construction to express an associative reading, as shown in (21a). Like the Chinese example in (20b), the conjoined phrase in (21a) is followed by a plural pronoun. The noun in (21a) exhibits a three-way ambiguity. The same is true for Japanese associative plurals, as in (21b).

(21) a. <u>Afrikaans</u> (den Besten 1996)   b. Japanese
        Piet   en   Koos-hulle   *Taro   to   Sayuri-tati*
        Piet and Koos-them   Taro and Sayuri-PL
        'Piet and Koos and their folks.'   'Taro and Sayuri and their associates'
        'Piet and Koos and another person' 'Taro and Sayuri and another person'
        'Piet and Koos'   'Taro and Sayuri'

This similarity between Afrikaans and Japanese can be brought out by assuming that there is a covert plural pronoun in Japanese associative plurals.

5   Conclusion

This paper argued that the Japanese plural morpheme takes a covert plural pronoun as its complement, and that a host noun is located in the specifier of the phrase headed by the plural morpheme. The main semantic contribution of the plural morpheme is to specify a relationship between a contextually salient group and a representative of that group. I proposed that this semantic content of the plural morpheme is mapped directly onto syntactic structure. The proposed analysis can capture the data which have not previously received much attention in the literature.

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