Extended GL and Japanese Postposition No

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Abstract. This paper proposes elaboration of the Generative Lexicon (GL) in Pustejovsky (1995) and the Extended Generative Lexicon theory (Lenci et al., 2000). My proposal is based on the Japanese genitive postposition no. The Japanese noun phrase structure expresses a wider range of relations between two entities than the English possessive noun phrase, such that neither selective binding (Pustejovsky, 1995) nor type-shifting based on qualia roles in NP2 (Vikner and Jensen, 2002) captures the necessary relations—time, location, manner, and others of temporary nature. The disambiguation of possessive relations requires that lexical entries be augmented by incorporating a Referential Module comprising subcategories such as LOCATION, TIME, and MANNER.

Keywords: Generative Lexicon, Referential Module, possessive relation, Japanese genitive marker, selective binding

1 Inherent Problems with Selective Binding

GL proposed in Pustejovsky (1995) encodes four qualia roles which originate in Aristotle’s concept of matters and represent four inherent properties. CONSTITUTIVE quale represents part-whole relation, FORMAL role indicates shape, ontological category, and so forth, TELIC role represents purpose and AGENTIVE role expresses origin.

Pustejovsky (1995) further suggests selective binding when computing the meaning of the noun phrases modified by non-intersective adjectives. For example, fast in a fast typist does not denote a typist who is also generally fast apart from typing, but specifically a typist who is fast at typing. In other words, fast does not modify the typist himself, but it does modify the way that the typist types, i.e., fast modifies the event argument of the TELIC (purpose) quale of the noun typist—to type.

(1) \[ [\text{fast} \cdot \text{typist}] = \lambda x[\text{typist}(x) \land \ldots[\text{TELIC} = \lambda e[\text{type}(e) \land \text{agent}(e) = x \land \text{fast}(e)] \ldots] \]

Selective binding works for some of the prenominal possessive modification in Japanese when NP1-no phrases modify one of the qualia of NP2, that is, selectively bind an event contained in the quale. However, I will show that there are many examples in which selective binding does not apply.

1.1 Problems with Selective Binding: Modification of Non-inherent Property

When possessive nominals represent temporary or changeable features of possessee nominals, there is no selective binding of any inherent qualia. For example, the following patterns cannot be accounted for within the existing framework.

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1 I consider the Japanese -no to be a postposition following Gunji (1987) and others.
TIME  yugata-no   koen
    evening-GEN park
   “an evening park”

LOCATION  Tokyo-no   shinseki
   Tokyo-GEN relative
  “a relative in Tokyo”

chikaku-no   koen
neighborhood-GEN park
“a nearby park”

ACCOMPANIMENT  boshi-no   fujin
   hat-GEN  lady
“the lady with a hat”

PROPERTY  jutai-no  Shakuruton
   seriously ill-GEN Shackleton
   “seriously ill Shackleton”

1.1.1 Time When possessive modification is temporary in nature or “stage-level” (Carlson, 1977), there is no selective binding of any inherent qualia. A temporal genitive phrase such as yugata-no “evening’s/in the evening” does not modify any of the AGENTIVE or TELIC role because yugata-no koen “a park in the evening” does not imply a park built in the evening nor does it imply one built solely for playing in the evenings. It rather refers to the appearance of a park in the evenings. For example, walking an evening park implies walking the park in the evenings.

(3) Yugata-no   koen-o sanposhi-ta.
    evening-GEN park-ACC walk-PAST
   “I walked in a park in the evening.”

(4) [evening\_park] \neq \lambda x[\text{park}(x) \land [\text{TELIC} = \lambda e[\text{recreational\_activity}(e) \land \text{time}(e) = \text{evening}]...]

1.1.2 Location We shall consider an example chikaku-no   koen “a nearby park.” The locative genitive phrase chikaku-no “nearby” does not modify the AGENTIVE (origin) role of the park, which would mean that the park was created in a nearby location. Chikaku-no modifies something non-inherent to the noun, for the nearby park might not have been in the speaker’s neighborhood when it was made; it might be presently located in the neighborhood. The speaker might have recently moved to the nearby location.

(5) [nearby\_park] \neq \lambda x[\text{AGENTIVE} = \lambda e[\text{make\_act}(e) \land \text{theme}(e) = x \land \text{location}(e) = \text{neighborhood}]...]

Similarly, Tokyo-no   shinseki “a relative in Tokyo” need not imply that the relative was born in Tokyo; it probably implies he currently resides in Tokyo. Therefore, the AGENTIVE role modification is not relevant. It is also possible to meet a relative living in Tokyo (Tokyo-no   shinseki) in Rome, which indicates that what matters is the recent general location of the referent.

(6) Tokyo-no   shinseki-to Roma-de atta.
    Tokyo-GEN relative-with Rome-LOC met
   “I met a relative from Tokyo in Rome.”

2 BCCWJ (2008)
1.1.3 Outstanding Property If azaleas are the outstanding features of the park, *tsutsuji-no* “with azaleas” modifies the present state of the park; however, it does not necessarily modify the AGENTIVE role of the park since the azaleas could have been planted only recently.

(7) tsutsuji-no koen
    azalea-GEN park
    “a park with azaleas”

(8) \[park_{with\_azaleas}\] \(\neq\) \(\lambda x[park(x) \land [AGENTIVE = \lambda e[\text{make\_act}(e) \land \text{theme}(e) = x \land \text{manner}(e) = \text{with\_azaleas}]]\]...

In this regard, the selective binding of qualia roles cannot explain possessive modification.

1.2 Successful Application of Selective Binding: Modification of Inherent Property

Although selective binding does not apply to many possessives, it successfully applies to many others. The following sections indicate that modifications of inherent properties can be properly explained by selective binding.

1.2.1 TELIC Quale Modification: Time When \(NP_{1\text{-no}}\) phrases are temporal modifiers of inherent nature, the selective binding works. For example in "7-ji-no nyusu “7 o’clock news,” the purpose, or the TELIC role, of news is to describe current events or information; therefore, 7-ji-no “7 o’clock’s” modifies the TELIC role of *nyusu “news”* such that the TELIC role of the 7-ji-no *nyusu “7 o’clock news”* is to describe the events taking place at 7 o’clock.

(9) 7-ji-no nyusu
    7 o’clock-GEN news
    “7 o’clock news”

(10) \[7\text{-o’clock\_news}\] \(=\) \(\lambda x[\text{news}(x) \land [\text{TELIC} = \lambda e[\text{describe}(e) \land \text{time}(e) = \text{at\_seven}]]\]...

1.2.2 TELIC Quale Modification: Trade and Activity Genitive phrases that represent trade and activity of the referent of \(NP_2\) in Table 1 at the end of this article are considered to be modifiers of the TELIC role of the \(NP_2\). Trade is regarded to play the TELIC role.

(11) biiru-no machi Munhen
    beer-GEN town Munich
    “the city of beer Munich”
Similarly, if Coach is a bag store, the TELIC role of Coach lies in the act of selling, and bags are the theme of the selling event.

1.2.3 Agentive Role Modification: Location Osuro kogai-no mura “a village in the suburb of Oslo” can be analyzed in a similar manner. Here, a village in the suburb of Oslo implies a village created in the location in the suburb in Oslo.

1.3 Extended Qualia in SIMPLE

As an extended GL, SIMPLE (Lenci et al., 2000) contains more ontological information, more argument structure and terminology than GL, and has the scope of application to language engineering. The extended qualia structure consists of the same four qualia roles as those in GL, namely, AGENTIVE, TELIC, CONSTITUTIVE and FORMAL roles, which may also have their subcategories that did not exist in GL.

An innovative feature of SIMPLE is that it provides language neutral templates for lexicons. For example, in any language, anything that belongs to a category of instruments is assigned the same template.

However, even with an extended qualia structure, SIMPLE fails to account for the complete range of meaning of possessive construction. Even though it provides more ontological information and more detailed qualia roles than the original GL, time, location, and other properties are not part of the lexical information in SIMPLE so that possessives are not allowed to modify these properties of NP.

2 Problems with Type-shifting Possessee Noun by Qualia

In formal semantics, Pustevjovsky’s qualia structure has been applied for deriving possessive relations by means of the type-shifting mechanism. Instead of selective binding, Vikner and Jensen (2002) type-shift the possessor noun using one of the qualia roles to explain the meaning of the genitive phrases following Partee (1997). This section overviews their theories and demonstrates that even these methods do not sufficiently explain the Japanese possessives.

2.1 Partee (1997)

Possessive relations are ambiguous in both English and Japanese. For example, there is more than one interpretation for John’s book. It may refer to the book that John owns or the book that John wrote (Barker, 1995, 87).

In view of such ambiguity, Partee (1997) assumes two syntactic types for John’s depending on whether or not the following noun is inherently relational. If the following noun is a non-relational common noun (CN) such as car, John’s composes with car which is a regular \((e, t)\) type predicate, namely, a function from individuals to truth-values (Montague, 1973), and the relation between John and car is contextually supplied (16a). On the contrary, when John is followed by inherently relational nouns such as brother, employee and enemy, which are \((e, (e, t))\) type with an extra argument slot (a function from individuals to another function from individuals to truth-values), the relation between John and his brother in John’s brother inherits kinship from the two-place predicate brother.

\[\text{city of beer} = \lambda x[\text{town}(x) \land \text{TELIC} = \lambda e[\text{make act}(e) \land \text{theme}(e) = \epsilon z.\text{beer}]]...\]

Similarly, if Coach is a bag store, the TELIC role of Coach lies in the act of selling, and bags are the theme of the selling event.

\[\text{bags Coach} = \lambda x[\text{store}(x) \land \text{TELIC} = \lambda e[\text{sell act}(e) \land \text{theme}(e) = \epsilon z.\text{bag}]]...\]

1.2.3 Agentive Role Modification: Location Osuro kogai-no mura “a village in the suburb of Oslo” can be analyzed in a similar manner. Here, a village in the suburb of Oslo implies a village created in the location in the suburb in Oslo.

\[\text{village in the suburb of Oslo} = \lambda x[\text{village}(x) \land \text{AGENTIVE} = \lambda e[\text{make act}(e) \land \text{location}(e) = \text{Oslo-suburb}]]...\]

3 BCCWJ (2008)
(16)  a. Free R type:
Syntax: [John’s] _NP/CN_
Semantics: \( \lambda Q \lambda P[\text{john}(\lambda z[\exists x[\forall y[[Q(y) \land R(y)(z)] \leftrightarrow y = x] \land P(x)])] \)

b. Inherent relation type:
Syntax: [John’s] _NP/TCN_ (TCN: transitive common noun)
Semantics: \( \lambda R \lambda P[\text{john}(\lambda z[\exists x[\forall y[R(z)(y) \leftrightarrow y = x] \land P(x)])] \)

If we apply Partee’s theory to Japanese examples, most of the possessive relations with non-relational nouns are unpredictable, and the contextually supplied relation R remains largely ambiguous.

2.2 Vikner and Jensen (2002)
In order to reduce the cost of pragmatics, Vikner and Jensen (2002) apply the qualia structure (Pustejovsky, 1995) of the possessee noun and type-shift even a non-inherently relational NP into a relational noun. For example, even though _poem_ is not a relational noun, _John’s poem_ can be interpreted as the _poem_ that John composed because the internal semantic structure of _poem_ contains an author-of relation as AGENTIVE role. The meaning shifting operator Q_A raises a one-place holder _poem_ into a two-place holder. The type-shifted NP can now combine with the possessive NP, which has a uniform type \((((e, (e, t)), ((e, t), t)))\)—a function from a two-place predicate to a generalized quantifier type—so that the authorship relation is inherited from NP poem, and R is no longer a free variable.

(17) \( Q_A(\text{poem}) = \lambda x \lambda y[\text{poem}’(x) \land \text{compose}’(x)(y)] \)

However, even Vikner and Jensen (2002)’s method is not sufficient to systematically compute the meaning of the Japanese NP1-no NP2 “NP1-GEN NP2” construction. For example, in terms of location (III) in Tables 1 and 2, the relation between _Tokyo_ and _shinseki_ “a relative in Tokyo” is location which is not part of the qualia structure of relative. We also encounter a problem with _boshi-no fujin_ “the lady with a hat.” Since wearing a hat is not part of the qualia roles of the non-inherently relational noun _fujin_ “lady,” even Vikner and Jensen’s system is unable to supply the binder for R.

3 Extended GL: Extensional Module Modification

3.1 A Referential Module
As explained in the previous sections, non-inherent properties cannot modify any inherent qualia or extended qualia roles in NP2 so that neither selective binding nor type-shifting mechanism can apply. Even though many of the Japanese postpositional phrases selectively bind one of the qualia of the possessee nominals, we need to account for other cases that cannot be explained by existing qualia modification.

As Kikuchi and Sirai (2002, 2006) admit, the spatio-temporal location is the semantic content of a large number of Japanese possessive phrases.4

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4 Kikuchi and Sirai (2002, 2006) classify the semantic patterns of NP1-no NP2 construction into three categories in accordance with how the free relation variable R between the two entities represented by NP1 and NP2 is derived.

a. NP1 largely determines the relation: NP1 is either a spatio-temporal location, which modifies NP2, or a person/institution to whom the referent of NP2 belongs (e.g., _pari-no ie_ “a house in Paris”) and the possessive interpretation belongs (e.g., _Sheikusupia-no hon_ “Shakespeare’s book”).

b. NP2 mainly determines the relation: If NP2 refers to an event, a relation, or a function, then the referent of NP1 functions as its argument. If NP2 refers to an object, then its qualia structure (Pustejovsky, 1995) determines the relation between NP1 and NP2 (e.g., _Naomi-no haha_ “Naomi’s mother,” _machi-no hakai_ “the destruction of the city,” and _Toyota-no kuruma_ “Toyota’s car”).

c. Neither NP1 nor NP2 determines the relation. In some cases, R is contextually determined.
In order to accommodate noun modification by postpositional phrases that denote temporary location, time, accompaniment, and property, I propose that additional information be encoded into the lexicon, specifically, a referential module be added to GL:

(18) A Referential Module:

\[
\begin{align*}
\text{TIME} &= \text{AT} \\
\text{LOCATION} &= \text{IN} \\
\text{MANNER} &= \text{WITH} \\
\text{INSTRUMENT} &= \text{WITH}
\end{align*}
\]

In harmony with the present analysis, Enç (1987) discusses the temporal ambiguity of nouns such as *president, bird* and *brain*. For example, the *president* in (19) may refer to (i) the current president at time of utterance who acted foolishly when he was not president, or (ii) then president who is no more president at speech time.

(19) The president was a fool.

Musan (1999) also assumes that all noun phrases have a time argument. For example, in (20) below, the person referred to as the intern could have been a hard-working intern in the past or at present—the present intern who was a hard-working person when he was not an intern yet. In other words, the time argument of *the intern* can refer to the past time or the utterance time.

(20) The intern worked hard.

Moreover, according to Sowa (1999), all physical objects usually occupy some space and time. Therefore, we incorporate location and time as subcategories of the referential module.

The following sections demonstrate how the extended GL renders the genitive modification underviable from the previous qualia structure.

### 3.2 Locative Modification

The lexical input for *shinseki* “relative” in GL should not allow modification by a locative genitive phrase *Tokyo-no* “in Tokyo” under the existing GL, since *Tokyo-no* “in Tokyo” would not modify any inherent qualia roles.

(21) Tokyo-no shinseki

Thomas GEN relative

“a relative in Tokyo”

GL:

[SHINSEKI “RELATIVE”]

\[
\begin{align*}
\text{TYPESTR} &= \text{RELATIVE} \\
\text{EVENTSTR} &= \text{STATE} \\
\text{ARGSTR} &= \text{HUMAN} \\
\text{QUALIA} &= \text{KINSHIP, RELATION}
\end{align*}
\]

Therefore, we incorporate location as part of the referential or extensional module (EXT) such that the location of a relative can be modified by the locative postpositional phrase as in (22).
Extended GL:

**SHINSEKI “RELATIVE”**

- **TYPESTR** = $h$
  - ARG1 = $x$ RELATIVE

- **EVENTSTR** =
  - E1 = STATE
  - E2 = PROCESS
  - E3 = STATE

- **ARGSTR** =
  - D-ARG1 = HUMAN
  - D-ARG2 = HUMAN
  - D-ARG3 = LOCATION

- **QUALIA** =
  - FORMAL = KINSHIP_RELATION
  - AGENTIVE = KINSHIP_RELATION

- **EXT** = LOC = AT(TOKYO)

**TOKYO-no shinseki “Tokyo relative”**

- **TYPESTR** = $h$
  - ARG1 = $x$ RELATIVE

- **EVENTSTR** =
  - E1 = STATE
  - E2 = PROCESS
  - E3 = STATE

- **ARGSTR** =
  - D-ARG1 = HUMAN
  - D-ARG2 = HUMAN
  - D-ARG3 = LOCATION

- **QUALIA** =
  - FORMAL = KINSHIP_RELATION
  - AGENTIVE = KINSHIP_RELATION

- **EXT** = LOC = AT(TOKYO)

(22) $\lambda x[relative(y)(x) \land \ldots [EXT = \lambda e[LOC(e) = Tokyo] \ldots]$

### 3.3 Temporal Modification

The temporal genitive phrase such as *yugata-no “evening’s”* does not modify any of the AGENTIVE or TELIC roles. Rather, it refers to the appearance of a park during an evening visit; *yugata-no “evening’s”* locates the referent of the park into certain time period. In other words, *evening’s* modifies the referential content of the park in the extended GL.

**YUGATA-NO Koen “A park in the evening”**

- **TYPESTR** =
  - ARG1 = outdoor’s Location

- **ARGSTR** =
  - D-ARG1 = HUMAN
  - D-ARG2 = HUMAN
  - D-ARG3 = LOCATION
  - D-E1 = TRANSITION
  - D-E2 = STATE
  - D-E3 = PROCESS

- **QUALIA** =
  - CONSTITUTIVE = \{LAWN, BENCH, FOUNTAIN,\ldots\}
  - FORMAL =
  - TELIC = RECREATIONAL_ACTIVITY
  - AGENTIVE = MAKE_ACT

- **EXT** =
  - LOC = IN
  - TIME = AT(EVENING)
  - TIME = EVENING

(23) $\lambda x[park(x) \land [EXT = \lambda e[being-park(e) \land time(e) = evening]] \ldots]$
3.4 Accompaniment and Property by Manner

Carrying a hat or a bag is a temporary activity, that does not modify any inherent qualia roles. It does, however, modify the manner role in the EXT structure as shown below.

(24) boshi-no hito
    hat-GEN person
“the person with a hat”

\[
\text{TYPESTR} = \begin{cases} \text{human} \\ \text{LOC} \end{cases}
\text{ARGSTR} = \begin{cases} \text{E1} \end{cases}
\text{QUALIA} = \begin{cases} \text{FORMAL} \end{cases}
\text{EXT} = \begin{cases} \text{WITH-HAT} \end{cases}
\]

(25) \[ [\text{boshi} \ - \ no \ \text{hito}] = \lambda x[\text{person}(x) \land \text{EXT} = \lambda e[\text{be-person}(e) \land \text{manner}(e)=\text{with-hat}]] \ldots \]

4 Computation

Regarding the compositional calculation of meaning, I assume that the \( \epsilon \) operator and the \( \iota \) operator lower the types of common nouns into \( (e) \). The use of the \( \epsilon \) operator follows its use for Japanese nouns in Cann et al. (2005).

(26) boshi “hat”; \( \epsilon x. \) hat; some \( x \) satisfying \( \text{hat}(x) \), if there is one
    hito “person”; \( \iota y. \) person\( (y) \); the unique \( x \) satisfying \( \text{person}(x) \), if there is such a thing
    no: \( \lambda P \lambda Q. \ i y [Q(y) \land R(\epsilon x.P)(y)] \)
    boshi-no hito “the person with a hat”;
    \( \iota y. [\text{person}(y) \land \text{manner}(e) = \text{with}(\epsilon . \text{hat})(y)] \)

5 Application of Extended GL to English Prepositional Phrases

As originally indicated by Teramura (1980) and Makishita (1984), the meaning of the Japanese postposition -no varies to the extent that it cannot be translated into the English preposition of alone. Tables 1 and 2 demonstrate that -no is also translated into other prepositions, such as in, at, for, from, about, with, and also into noun compounds. They demonstrate that the Japanese genitive marker not only expresses possession as in Naomi’s bag and inalienable relations as in Naomi’s face but also aspects such as location, accompaniment, property, and quantity. There is even the reversal of the possessor argument between (I) and (V–VI). The possessor argument is NP\(_1\) in (I), as in English Naomi’s bag whose possessor argument is Naomi. On the contrary in (V), the possessor of the bag is NP\(_2\) hito “man” and there is no English equivalent big bag’s person. In (VI) Kaban-no Kochi “Bags Coach,” Coach is a store, and therefore the possessor of a bag. The controller-ctlrlee relation is also reversed, for example, in Naomi-no kuruma “Naomi’s car” (type I), Naomi is the controller of the car, i.e., NP\(_2\) the car is at Naomi’s disposal as in English the girl’s car (Vikner and Jensen, 2002). On the contrary, in boshi-no fujin “the lady with a hat,” NP\(_1\) boshi is at the person’s disposal. Aoi-me-no ningyo “the doll with blue eyes,” literally, “blue eyes’ doll” in (VIII) even expresses the part-whole relation in the reverse direction, compared with ningyo-no me “the doll’s eyes.”

As Johnston and Busa (1996) analyzed English nominal compounds in comparison with Italian prepositions by qualia modifications, the Extended GL introduced in this paper should apply to
non-inherent modification by prepositional phrases in other languages. Furthermore, the methodology presented should also apply to adjectival and prepositional modification in general, as far as such modifiers detect the presence of the event argument contained in common nouns that they modify.

6 Conclusion

Japanese genitive postpositions cannot be disambiguated in terms of the existing qualia of the possessee nominals. We need to augment the semantic content by adding another module REFERENCEAL or EXTENSIONAL structure. The present work provides an enriched lexical entry that enables access to the sense of NP and determines the semantic relation expressed by Japanese genitive postpositions. Future work concerns identifying which quale should be used for the interpretation of the possessive noun phrases.

<table>
<thead>
<tr>
<th>Relation</th>
<th>Japanese Possessive</th>
<th>English Possessive</th>
<th>English Compound</th>
<th>English PP</th>
</tr>
</thead>
<tbody>
<tr>
<td>I possession</td>
<td>Naomi-no kaban</td>
<td>Naomi’s bag</td>
<td>*Naomi bag</td>
<td>a bag of Naomi</td>
</tr>
<tr>
<td>II part-whole</td>
<td>Naomi-no kao</td>
<td>Naomi’s face</td>
<td>*Naomi face</td>
<td>the face of Naomi</td>
</tr>
<tr>
<td>III location</td>
<td>Tokyo-no shinseki</td>
<td>*Tokyo’s relative</td>
<td>Tokyo relative</td>
<td>relative in Tokyo</td>
</tr>
<tr>
<td>IV time</td>
<td>yugata-no koen</td>
<td>*evening’s park</td>
<td>an evening park</td>
<td>a park in the evening</td>
</tr>
<tr>
<td></td>
<td>natsu-no kyuka</td>
<td>*summer’s vacation</td>
<td>summer vacation</td>
<td>vacation in summer</td>
</tr>
<tr>
<td></td>
<td>7-ji-no nyusu</td>
<td>7 o’clock’s news</td>
<td>7 o’clock news</td>
<td>the news at 7 o’clock</td>
</tr>
<tr>
<td>V accompaniment</td>
<td>kaban-no hito</td>
<td>*bag’s man</td>
<td>the bag man</td>
<td>the man with a bag</td>
</tr>
<tr>
<td></td>
<td>boshi-no fujin</td>
<td>*hat’s lady</td>
<td>the hat lady</td>
<td>the lady with a hat</td>
</tr>
<tr>
<td>VI trade</td>
<td>Kaban-no Kochi</td>
<td>*Bags’ Coach</td>
<td>Bags Coach</td>
<td>Coach for Bags</td>
</tr>
<tr>
<td>VII activity</td>
<td>maaruboro-no kuni</td>
<td>*Marlboro’s country</td>
<td>Marlboro country</td>
<td>the country of Marlboro</td>
</tr>
<tr>
<td></td>
<td>biiru-no machi</td>
<td>*the beer’s city</td>
<td>*the beer city</td>
<td>the city of beer</td>
</tr>
<tr>
<td>VIII outstanding property</td>
<td>aoi-me-no ningyo</td>
<td>*blue eyes’ doll</td>
<td>blue eyes doll</td>
<td>the doll with blue eyes</td>
</tr>
<tr>
<td></td>
<td>tsutsuji-no koen</td>
<td>*azaleas’ park</td>
<td>*azalea park</td>
<td>a park with azaleas</td>
</tr>
<tr>
<td>IX weight</td>
<td>1-kiro-no pasokon</td>
<td>*1kg’s computer</td>
<td>a 1kg computer</td>
<td>*the computer of 1kg</td>
</tr>
<tr>
<td>X quantity</td>
<td>3-bon-no pen</td>
<td>*three’s pen</td>
<td>three pens</td>
<td></td>
</tr>
<tr>
<td>XI intensional property</td>
<td>nise-no fukahire</td>
<td>*fake’s shark fin</td>
<td>fake shark fin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nise-no keisatsukan</td>
<td>*fake’s police officer</td>
<td>fake police officer</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Data translated from Balanced Corpus of Contemporary Written Japanese, BCCWJ2008 edition, by The National Institute of Japanese Language

<table>
<thead>
<tr>
<th>Relation</th>
<th>Japanese Possessive</th>
<th>English Possessive</th>
<th>English Compound</th>
<th>English PP</th>
</tr>
</thead>
<tbody>
<tr>
<td>III location</td>
<td>Osuro kogai-no mura</td>
<td>*Oslo suburb’s village</td>
<td>*Oslo suburb village</td>
<td>a village in the suburb of Oslo</td>
</tr>
<tr>
<td></td>
<td>Hachioji-shi-no</td>
<td>Hachioji city’s volunteer group</td>
<td>Hachioji city volunteer group</td>
<td>in Hachioji city</td>
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<td>IV time</td>
<td>katsute-no ikoii</td>
<td>*past’s force</td>
<td>past force</td>
<td>Force in the past</td>
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<td></td>
<td>manatsu-no hyoran</td>
<td>summer peak’s iceberg</td>
<td>summer peak iceberg</td>
<td>iceberg in the peak of summer</td>
</tr>
<tr>
<td></td>
<td>natsu-no kaidan-jiki</td>
<td>*summer’s horror season</td>
<td>summer horror season</td>
<td>horror season in summer</td>
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<td>VIII outstanding property</td>
<td>jutai-no Shakuruton</td>
<td>*serious illness’s Shackleton</td>
<td>*serious illness Shackleton</td>
<td>Shackleton in serious illness</td>
</tr>
<tr>
<td>X quantity</td>
<td>9-nin-no esukimo</td>
<td>*nine’s Eskimos</td>
<td>nine Eskimos</td>
<td>*Eskimos of nine</td>
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References


