An Event-Based Semantics for Japanese Emphatic Particles

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Abstract

Following Herburger (2000), I will develop an event-based semantics for Japanese emphatic particles which can address the issue of the mechanism of association with focus involving the emphatic particles. The proposed semantics makes use of Herburger's three key ideas: events as basic entities, decomposition of predicates into subatomic formulas, and separation of backgrounded and foregrounded information.

1   Emphatic particles

Japanese emphatic particles I will take up in this paper correspond to English adverbs *only*, *even*, and *also*, among others, of which *only* could be arguably a determiner when it occurs in prenominal position. Japanese has three kinds of postnominal particles constituting noun phrases: *kaku zyosi* case particles (*ga*, *o*, *ni*, etc.), *huku zyosi* supplementary particles (*dake* 'only', *made* 'as far as', *bakari* 'only', etc.), and *kakari zyosi* lead-in particles (*wa* 'TOPIC', *mo* 'also', *sae* 'even', *sika* 'except', etc.). In the recent Japanese linguistics literature, supplementary and lead-in particles are grouped together to form a class known as *toritate zyosi* particles for taking up (entities). This appellation of the new class is taken to mean that such particles mark different modes of conceptualization of the entity taken up for predication (Miyazima and Nitta, 1995: 278). Semantically, they all have to do with focus, as some of their semantic counterparts in English suggest. In this paper, I will refer to the class of *toritate zyosi* as emphatic particles (EP, henceforth).

The main concern of this paper is to suggest a systematic way to capture the meanings of Japanese EPs based on the treatment of focus and quantification by Herburger (2000). I will show a DRT semantics of EPs, which uses thematic roles as predicates and is many-sorted in the sense of having variables for events as well as those for individuals. This semantic treatment is an attempt to reveal the role played by focus in the overall workings of Japanese post-nominal particle affixation systems, and not just that of EP affixation.

2   Internally- vs. externally-induced focus

The word **focus** is used in two different, but unifiable senses in semantics. In one sense, it is what explains question-answer congruence as shown in (1)

(1) a. Who did John introduce to Sue?

   b. John introduced [Bill]$_F$ to Sue.

   c. #John introduced Bill to [Sue]$_F$.

In the other sense, focus is the locus of the scope of certain adverbs and adverbial expressions (focus-sensitive operators) such as *only*, *even*, and *also*.

(2) a. John only introduced [Bill]$_F$ to Sue.

    b. John only introduced Bill to [Sue]$_F$.

In alternative semantics theories of focus, as proposed by Rooth (1985, 1992, etc.), the two senses of focus can be uniformly characterized by means of focus semantic values and association with focus. The focus semantic value of a sentence like (1b) is a set of alternative propositions such as (3) which might equally well serve as the answer to the question if things were differently arranged.

(3) { {John introduced John to Sue.}, {John introduced Bill to Sue.}, {John introduced Mike to Sue.}, ...}

Association with focus captures the felicity of (1b) given (1a), as opposed to the infelicity of (1c), which has a different set of alternative propositions $\{p = \|John\ introduced\ Bill\ to\ d\|\|\|d\| \in D\}$ which does not correspond to (1a), or the focus semantic value of (1b). Basically, the process of association with focus consists of the identification of a contextually constrained set of alternative propositions given a sentence containing a focus operator (e.g. (3) in a more contextually constrained form) and the confirmation of the proposition corresponding to the given sentence as a (non-unique) member of the set.

Although the two senses of focus can thus be treated uniformly, I will call the sense involved in question-answer congruence **externally induced** because the focus is not licensed by an explicit focus-sensitive operator, and that involved in sentences containing focus-sensitive operators like *only* **internally induced**. Since EPs in Japanese mostly correspond to focus-sensitive operators, their semantics should benefit from taking account of the concept of internally induced focus. Moreover, we will see the semantics of some EPs should best be given in conjunction with that of the case particle *ga*, and possibly that of *o*.

3 EPs and domain selection

As we saw in (1) and (2), association with focus in English is typically determined by the locus of focus accent in the sentence.[1] By contrast, in the case of Japanese EPs, association with focus is dictated by the constituent structure in which they occur rather than focus accents. Since EPs are directly attached to the nominal to be focused, cancellation of focus effects due to special contextualization is not possible.

(4) a. kome-o   saibai-suru hitotati-wa kome-dake-o   tabe-ru
       rice-ACC grow-PRESpeople-TOP rice-ONLY-ACC eat-PRES
       'People who grow rice only eat rice. '

    b. kome-o   saibai-suru·hitotati-wa kome-wa tabe-ru-dake   da
       rice-ACC grow-PRESpeople-TOP rice-TOP eat-PRES-ONLY COPULA
       'People who grow rice only do the eating of rice. '

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[1]Such focus effects can be cancelled by suitable contexts as shown in the next sentence.

(i)People who [grow]$_F$ rice generally only [eat]$_F$ rice. (Rooth 1992, p. 109)
(ii) They don't eat [meat]$_F$, or [bread]$_F$

In (i), association of *only* with the focused verb in its scope does not take place because of the preceding context in the sentence. A natural continuation is as in (ii).

114

As in (4a), the EP *dake* is attached to the nominal *kome*, which is the focus of the sentence. (4b) has *dake* attached to the nominalized verb *tabe-ru*, giving rise to a contradictory meaning. It is not possible for (4b) to get the same interpretation as for (4a) by any contextualization.

However, Japanese EPs do need an adequate theory of domain selection. In any alternative semantics theory of focus, the focus semantic value of a clause containing a focus operator such as (3) needs to be meaningfully restricted as pointed out by Schwarzschild (cf. Kadmon(2000, p. 307)).[2] A very conservative measure proposed in Ishikawa (2001) uses the concept of **directly comparable proposition** (DCP, henceforth). The DCP of a clause with an EP is an F-structure representation of LFG which is derived from the F-structure of the clause by replacing the PRED value of the focused grammatical function (i.e., the scope of the EP) by a variable X constrained to be the comparable elements of the PRED value as shown in (5c), where the set of three feature-value pairs stands for the semantic contribution of the EP which induced the DCP.

(5) a. Taro-dake-ga   ki-ta
    Taro-ONLY-NOM come-PAST
    'Only Taro came.'

b.
$$\begin{bmatrix} \text{SUBJ} & \begin{bmatrix} \text{SCOPE} & \begin{bmatrix} \text{PRED} & \text{'TARO'} \end{bmatrix} \\ \text{EP} & \text{DAKE}_{\boxed{1}} \end{bmatrix} \\ \text{PRED} & \text{'come}\langle\text{SUBJ}\rangle\text{'} \end{bmatrix}$$

c.
$$\begin{bmatrix} \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'COMP(X,TARO)'} \\ \text{TYPE} & \textit{set-theoretic} \\ \text{SELF} & \textit{unique} \\ \text{POLARITY} & \textit{reverse} \end{bmatrix}_{\boxed{1}} \\ \text{PRED} & \text{'come}\langle\text{SUBJ}\rangle\text{'} \end{bmatrix}$$

Although DCPs can avoid Schwarzschild's problem associated with the alternative semantics theories, the representation suffers from two major drawbacks which are related with each other. Since F-structure is essentially a syntactic representation, the derived F-structures used for the representation of DCPs are mainly concerned with explaining the cooccurrence restrictions of EPs within a clause. As a result, the semantics of EPs is indicated only in terms of the combination of the values for four features: **type, self, edge** and **polarity**. This lack of modeltheoretic semantics for DCPs makes it difficult for this theory to do justice to the role played by focus in the workings of EPs, which can be seen in the fact that domain selection has no place in the theory because it is fixed. Although EPs are directly attached to their scope, so to speak, the actual focus can be wider than the immediate constituent they form a part of. Consider (6) in a context where Taro was supposed to finish several chores besides writing a letter in the morning.

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[2]The problem is that the definition of focus semantic value allows unwanted propositons to be in the set of alternatives.

(i)Sue is [bold]$_F$
(ii)$\|(i)\|^f = \{\|X(s)\|^g : g \; assignment \; function\}$

Since $\|\lambda x[beautiful(m)]\}\|$ is also a member of $D_{<e,t>}$, the set of alternatives will include such propositon as 'Mary is beautiful' as well as 'Sue is beautiful', etc. (Kadmon, p. 307)

(6) Taro-wa   asa   tegami-dake kai-ta
    Taro-TOP   morning letter-ONLY write-PAST
    'Taro only wrote the letter in the morning. '

(6) can have both VP focus (the intended interpretation here) and N focus (comparing the letter with the other things to be written). This kind of ambiguity in focus scope clearly points to a more flexible treatment of the scope of EPs. We will address this problem by providing a Davidsonian semantics for Japanese EPs.

4 Structured Davidsonian decomposition

Herburger (2000) treats the problem of focus in connection with its interaction with negation, adverbial quantifiers, determiners and *only* and *even*. For the semantic representation, she proposes a many-sorted predicate logic notation, which she call **structured Davidsonian decomposition** (SDD, henceforth). The SDD of a clause with a focus is a logical form containing both event and individual variables (thus, Davidsonian) in which the predicate of the clause is decomposed into logical predicates corresponding to the original predicate and its associated thematic roles (cf. Parsons (1990)). But it is different from a simple Davidsonian decomposition in that it is structured into the backgrounded information and foregrounded information of the clause. (7a & b) have (8 a & b) as their SDDs (Herburger's (1) and (12)).

(7) a. ROSALIA wrote a poem.

   b. Rosalía wrote A POEM.

(8) a. $[\exists e : C(e) \ \& \ Write(e) \ \& \ Past(e) \ \& \ [a \ x : Poem(x)]Theme(e,x)]$
        $Agent(e, rosalia) \ \& \ Write(e) \ \& \ Past(e) \ \& \ [a \ x : Poem(x)]Theme(e,x)$

   b. $[\exists e : C(e) \ \& \ Agent(e, rosalia) \ \& \ Write(e) \ \& Past(e)]$
       $[a \ x : Poem(x)]Theme(e,x) \ \& \ Agent(e, rosalia) \ \& \ Write(e) \ \& \ Past(e)$

In both (8 a & b), the first line represents the backgrounded information and the second line the foregrounded information of the clause. C in $C(e)$ stands for the context of utterance. Besides certain possible considerations of quantification discussed in Schein (1993), the overlap between the background part and the foreground part is largely due to the procedure of deriving SDDs from LFs. As far as the semantics of focus is concerned, there is no strong reason why we should retain such overlapping information in the semantic representation of focused clauses.

Another problem with Herburger's SDD notation is that the SDD derivation procedure needs to be augmented with translation rules, which are called equivalences, such as in (9) in the case of *only* and *even*. This suggests that SDDs might not be amenable to direct modeltheoretic interpretation as hinted by Herburger (2000, p.19).

(9) $[only \ e : \ F(e)] \ G(e) \ iff \ F \neq \{\}$
    $\& \ \forall f((f \in F) \rightarrow \exists e(Part(f, of \ e) \ \& \ e \in G))$

For these reasons, I will adapt the three component ideas involved in her structured Davidsonian decomposition to develop a focus semantics of Japanese EPs which can overcome the drawbacks of Ishikawa (2001): events as basic entities, decomposition into subatomic formulas, and separation between background and foreground information.

116

5   An event-based semantics for Japanese EPs: ESJEP

I will use DRSs which are extended in terms of legitimate basic entities somewhat along the lines suggested by Asher (1993). Let us first consider how (6) (repeated here as (10)) should be represented in our **ESJEP** notation. (11) and (12) correspond to the N focus reading and the VP focus reading, respectively.

(10)   Taro-wa   asa   tegami-dake kai-ta
       Taro-TOP   morning letter-ONLY write-PAST
       'Taro only wrote the letter in the morning. '

(11)   [e, x, y: past(e), write(e), in(e,the-morning), agt(e,x), x = taro, theme(e,y), y = this-letter,

          [e': e'$\sqsubset$ e, past(e'), write(e'), in(e',the-morning), agt(e',x)] $\Rightarrow$ [theme(e',y)]]

(12)   [e, x, y: past(e), write(e), in(e,the-morning), agt(e,x), x = taro, theme(e,y), y = this-letter,

          [e': e'$\sqsubset$ e, past(e'),in(e',the-morning), agt(e',x)] $\Rightarrow$ [write(e'), theme(e',y)]]

Association of *dake* 'only' with its focus is represented by the conditional statement in each DRS, where e'$\sqsubset$ e signifies that e' is comparable to e. In the case of (11), the righthand DRS in the conditional statment specifies the uniquness of the theme argument, whereas, in (12), it is the uniqueness of the writing event itself that is specified there. The distinction between background and foreground information is also captured by the conditional statement.

The derivation of ESJEP DRSs starts with the F-structure of a clause with an EP or EPs. The decompostion of the predicate into subatomic predicates is mediated by the two levels of lexical information: 'semantic' structure and 'argument' structure as proposed by Mohanan (1997).

The following shows a schematic correspondence relationship between an F-str with the EP *dake* and its N- and VP-focus ESJEPs.

(13)
$$\begin{bmatrix} \text{GF}_i & \begin{bmatrix} \text{SCOPE} & [\text{PRED} \quad \text{'x'}] \\ \text{EP} & \text{DAKE} \end{bmatrix} \\ \text{PRED} & \text{'verb}\langle \ldots \text{GF}_i \ldots \rangle \text{'} \end{bmatrix}$$

(14)   [e,x: verb(e),$\theta_1, \ldots, \theta_{i-1}, \theta_i, \theta_{i+1}, \ldots, \theta_n, \ldots$

          [e': e'$\sqsubset$ e, verb(e'), $\theta_1, \ldots, \theta_{i-1}, \theta_{i+1}, \ldots, \theta_n] \Rightarrow [\theta_i$(e,x)]]

(15)   [e,x: verb(e),$\theta_1, \ldots, \theta_{i-1}, \theta_i, \theta_{i+1}, \ldots, \theta_n$

          [e': e'$\sqsubset$ e, $\theta_1, \ldots, \theta_{i-1}, \theta_{i+1}, \ldots, \theta_n] \Rightarrow [$verb(e'), θ_i(e,x)]]

6   The semantics of *mo*

The semantics of the EP *mo* 'also' requires that the thematic role in the scope of *mo* should potentially be filled by a different discourse referent as shown in (16) and (17).

(16) a. Taro-mo ki-ta
      Taro-MO come-PAST
      'Taro also came.'

   b. Taro-wa   kono-tegami-mo kai-ta
      Taro-TOPIC this-letter-MO   write-PAST
      'Taro also wrote this letter.'

But, in this case, the nature of DCPs induced by *mo* is more presuppositional than potential. Both (16a) and (16b) should be judged semantically abnormal if no comparable situations with different discourse referents occurring in place of those for Taro and this letter. Compare this situation with that of (7), where both backgrounded information and asserted information correspond to parts of a sentence. By contrast, in (16a), for example, backgrounded information comes in two kinds, as it were. The first kind corresponds to an explicit sentence-part, i.e., $\lambda x(came(x))$, whereas the second kind is introduced by *mo* 'also' and propositional in nature, i.e., $\exists x(x \neq taro \ \& \ came(x))$ or its existential instantiation using a contextually adequate individual name.. This second kind of backgrounded information must be anaphorically satisfied in the sense of (Geurts 1999). Moreover, the problem of deciding exactly what proposition we should take as the presupposition of such a *mo*-marked sentence in a particular context has to do with that of domain selection as discussed by Rooth. In (16a), the presuppostion could as well be the existence of another happy incident at the party, such as an early departure of Bill, or more generally, another happy situation, such as the venue which everybody liked a lot. All in all, the schematic correspondence rule must refer to these two kinds of background information.

(17)
$$\begin{bmatrix} \text{GF}_i & \begin{bmatrix} \text{SCOPE} & \begin{bmatrix} \text{PRED} & \text{'X'} \end{bmatrix} \\ \text{EP} & \text{MO} \end{bmatrix} \\ \text{PRED} & \text{'verb}\langle \ldots \text{GF}_i \ldots \rangle \text{'} \end{bmatrix}$$

(18)   [e,x: verb(e),$\theta_1, \ldots, \theta_{i-1}, \theta_i, \theta_{i+1}, \ldots, \theta_n$
        [e', y: e'$\sqsubset$ e, verb(e'), $\theta_1, \ldots, \theta_{i-1}, \theta'_i(e,y), \theta_{i+1}, \ldots, \theta_n$]$\Rightarrow$ [y $\neq$ x]]

(19)   [e,x: verb(e),$\theta_1, \ldots, \theta_{i-1}, \theta_i, \theta_{i+1}, \ldots, \theta_n$
        [e', y: e'$\sqsubset$ e, $\theta_1, \ldots, \theta_{i-1}, \theta'_i(e,y), \theta_{i+1}, \ldots, \theta_n$]$\Rightarrow$ [$\neg$ verb(e'), y $\neq$ x]]

As with *dake*, the distinction of background and foreground information is represented by the difference between the assertion in the main DRS and the comparable situation in the conditional condition. The presuppositional nature of the second kind of background information is captured by the use of underlined discourse referents e' and y, which correspond to pronominal expressions requiring antecedents. Such antecedents must be either available in the accessible domain or accommodated. (20) and (21) correspond to (15b).

(20)   [e, x, y: past(e), write(e), agt(e,x), x = taro, theme(e,y), y = this-letter,
        [e', z: e'$\sqsubset$ e, past(e'),write(e'), theme(e',z), agt(e',x)] $\Rightarrow$ [y $\neq$ z]]

(21)   [e, x, y: past(e), write(e), agt(e,x), x = taro, theme(e,y), y = this-letter,
        [e', z: e'$\sqsubset$ e, past(e'), theme(e',z), agt(e',x)] $\Rightarrow$ [$\neg$ write(e'), y $\neq$ z]]

The EP *sae* is similar to *mo* in that it also indicates the presence of another discourse referent potentially fulfilling the thematic role in its scope, but, unlike *mo*, the comparable event e' is further restricted by a certain relation of unexpectedness. This situation is represented by using $\prec$ instead of $\sqsubset$ in (23) and (24).

(22)
$$\begin{bmatrix} \text{GF}_i & \begin{bmatrix} \text{SCOPE} & \begin{bmatrix} \text{PRED} & \text{`X'} \end{bmatrix} \\ \text{EP} & \text{SAE} \end{bmatrix} \\ \text{PRED} & \text{`verb} \langle \ldots \text{GF}_i \ldots \rangle \text{'} \end{bmatrix}$$

(23)   [e,x: verb(e),$\theta_1, \ldots, \theta_{i-1}, \theta_i, \theta_{i+1}, \ldots, \theta_n$
          [e', y: e'$\prec$ e, verb(e'), $\theta_1, \ldots, \theta_{i-1}, \theta'_i(e,y), \theta_{i+1}, \ldots, \theta_n$]$\Rightarrow$ [y $\neq$ x]]

(24)   [e,x: verb(e),$\theta_1, \ldots, \theta_{i-1}, \theta_i, \theta_{i+1}, \ldots, \theta_n$
          [e', y: e'$\prec$ e, $\theta_1, \ldots, \theta_{i-1}, \theta'_i(e,y), \theta_{i+1}, \ldots, \theta_n$]$\Rightarrow$ [$\neg$ verb(e'), y $\neq$ x]]

7   Topical vs. contrastive *wa*

Following Ishikawa (2001), topical *wa* is considered as **link** in the sense of Vallduví(1992), marking the presentation of the clause topic. By contrast, contrastive *wa* is an EP which interacts with focus and negation.

The difference between contrastive *wa* and *dake* can be shown by introducing a modal operator indicating a lack of information.

(25) Taro-wa   asa   tegami-wa   kai-ta
     Taro-TOP morning letter-CONTRAST write-PAST
     'Taro wrote [the letter]$_F$ in the morning. '

(26)   [e, x, y: past(e), write(e), in(e,the-morning), agt(e,x), x = taro, theme(e,y), y = the-letter
          [e', z: e'$\sqsubset$ e, in(e',the-morning), agt(e',x), theme(e',z), z $\neq$ y]
          $\Rightarrow$ [$\Diamond \neg$ write(e')]]

(28) shows how ESJEP captures the interaction of contrastive *wa* and negation, where the focused argument and the main predicate equally attract the negation of the clause.

(27) Taro-wa   asa   tegami-wa   kak-anakat-ta
     Taro-TOP morning letter-CONTRAST write-NEG-PAST
     'Taro did not write [the letter]$_F$ in the morning. '

(28)   [e, x, y: past(e), $\neg$ write(e), in(e,the-morning), agt(e,x), x = taro, theme(e,y), y = the-letter
          [e', z: e'$\sqsubset$ e, in(e',the-morning), agt(e',x), theme(e',z), z $\neq$ y,] $\Rightarrow$ [$\Diamond \neg\neg$ write(e')]]

Contrast (27) and (28) with (29) and (30), which does not involve an EP.

(29) Taro-wa   asa   tegami-o   kak-anakat-ta
     Taro-TOP morning letter-ACC write-NEG-PAST
     'Taro did not write the letter in the morning. '

(30) [e, x, y: past(e), ¬write(e), in(e,the-morning), agt(e,x), x = taro, theme(e,y), y = the-letter]

Thus, I propose the following correspondence schema for contrastive *wa*.

(31)
$$\begin{bmatrix} \text{GF}_i & \begin{bmatrix} \text{SCOPE} & \begin{bmatrix} \text{PRED} & \text{'x'} \end{bmatrix} \\ \text{EP} & \text{WA} \end{bmatrix} \\ \text{PRED} & \text{'verb}\langle \ldots \text{GF}_i \ldots \rangle\text{'} \end{bmatrix}$$

(32)   [e,x: verb(e),$\theta_1, \ldots, \theta_{i-1}, \theta_i, \theta_{i+1}, \ldots, \theta_n$
        [e', y: e'$\sqsubset$ e, verb(e'), $\theta_1, \ldots, \theta_{i-1}, \theta'_i(\text{e,y}), \theta_{i+1}, \ldots, \theta_n$,
    y $\neq$ x] $\Rightarrow$ [$\Diamond\neg$ verb(e')]]]

8   EPs' interaction with semantic case particles

In ESJEP, we can capture the difference in meaning between (33 a & b), which has been noted for some time but defied its formal characterization in semantic terms (cf. Ishikawa (1985)).

(33) a. sono kinko-wa kono kagi-dake-de   ak-u
         that safe-TOP this key-ONLY-INST open-PRES
         ' That safe can be opened with this key alone (without using any other)'

      b. sono kinko-wa kono kagi-de-dake˙   ak-u
         that safe-TOP this key-INST-ONLY open-PRES
         ' That safe can be opened with nothing other than this key (no other key works)'

Unlike grammatical case particles (*ga*, *o*, and *ni*), semantic case particles such as *de* 'with', *kara* 'from', etc. show scopal interaction with EPs.[3] In ESJEP, the two readings can be clearly distinguished as in (34) and (35). We notice that (35), which corresponds the case in which the EP has a case-marked N in its scope, has the structure along the lines of (14). By contrast, (32), where the EP has a bare N in its scope and is itself in the scope of the semantic case particle *de*, has the focus of *dake* as part of backgrounded information rather than that of foregrounded.

(34)   [e, x, y: potential(e), open(e), theme(e,x), x=that-safe, instr(e,y), y=this-key
        [e': e'$\sqsubset$ e, potential(e'), theme(e',x), [z: instr(e',z)] $\Rightarrow$ [z = y]] $\Rightarrow$ [open(e')]]]

(35)   [e, x, y: potential(e), open(e), theme(e,x), x=that-safe, instr(e,y), y=this-key
        [e': e'$\sqsubset$ e, potential(e'),open(e'), theme(e',x)] $\Rightarrow$ [instr(e',y)]]

We can conjecture that morphologically embedded EPs cannot make the item in its scope the primary focus of the clause, which must be sought elsewhere in it.

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[3]For some speakers, (33a) can admit both interpretations. But (33b) is not ambiguous.

(36) sono kinko-ga kono kagi-dake-de   ak-u
     that safe-GA this key-ONLY-INST open-PRES
     'It is that safe which can be opened with this key alone (without using any other)'

(37)   [e, x, y: potential(e), open(e), theme(e,x), x=that-safe, instr(e,y), y=this-key
            [e': e'⊏ e, potential(e'), open(e') [z: instr(e',z)] ⇒ [z = y]] ⇒ [theme(e',x)]]

Stacking two EPs *dake* and *wa* within a single phrase and following our correspondence schemas for them, we predict the following DRS for (38), which matches our intuitions.

(38) sono kinko-ga kono kagi-dake-de-wa   aka-na-i
     that safe-GA this key-ONLY-INST-CONTRAST open-NEG-PRES
     'It is that safe which cannot be opened with this key alone (without using any other)'

(39)   [e, x, y: potential(e), ¬ open(e), theme(e,x), x=that-safe, instr(e,y), y=this-key
            [e': e'⊏ e, potential(e'), theme(e',x) ¬ [z: instr(e',z)] ⇒ [z = y]] ⇒ [◇ open(e')]]

9   Conclusion

I have shown how a modeltheoretic semantics of Japanese EPs is possible using our ESJEP DRS notation, which is based on structured Davidsonian decomposition. Although I haven't given the definition of the semantics explicitly in this paper, it is standard except for some extensions necessary for dealing with anaphoric discourse referents, whose treatment is taken to be realized along the lines of (Geurts 1999). I believe I have shown the basic semantic effects of four EPs, i.e., *dake, mo, sae,* and *mo,* which can capture their interaction with negation and semantic case particles.

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