

## D-7

### How many times is the action repeated?

#### An analysis of semelfactive interpretations based on the combination of the verb and its object

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### Introduction

It is well known that verbs are classified into four aspectual categories according to Vendler (1957). In addition, there is another category called ‘semelfactive’. Semelfactive verbs are interpreted as inherently having repeatability, as in *Jones blinked* (that is, the closing and opening of the eyes can repeatedly occur).

In previous studies, Croft (2012) calls this aspectual type “cyclic achievement”. He argues that cyclic achievement is one of the achievements and has repeated interpretation.

(1) The mouse emits a squeak.

The verb *emit* in (1) is categorized into cyclic achievement. So it can be interpreted as having the transition from silence to squeak and the action can be repeated.

However, some previous studies suggest that repeatable interpretation of semelfactives emerges by coercion. Moens & Steedman (1988) show that progressive can trigger such coercion.

(2) Harry was hiccupping.

The verb *hiccup* in (2) is typically interpreted as a single action. However, when it is combined with the progressive expression, a repeated interpretation is coerced so that a durative reading can be accommodated for the progressive.

There are some experimental studies examining aspectual coercion such as Pinaño (1999), Brennan & Pykkänen (2008) and Ishii & Ishikawa (2016). Pinaño (1999) suggests that there is processing cost of coercion with semelfactives combined with durative adverbials. Brennan & Pykkänen (2008) also examined the processing cost of aspectual coercion by self-paced reading and MEG studies. Importantly, they were aware that there are two types of semelfactives: those which prefer single interpretations and those which prefer iterative interpretations. So they conducted a norming study in order to classify semelfactives into single and iterative ones. After the norming study, they examined whether the coercion would take place when the single verbs were combined with durative adverbials or punctual ones. They found effects of aspectual coercion for single verbs and durative adverbials. Ishii & Ishikawa (2016) found similar effects in Japanese with single verbs but not with iterative verbs.

In summary, the previous studies suggest that semelfactives are repeatable, and that the progressive and durative adverbials force repeated interpretations. It is also suggested that some expressions denote repeated actions by default. For example, Brennan & Pykkänen (2008) did a norming study regarding the repeatability using sentences with semelfactives. However, it is still not clear whether judgments regarding the repeatability are derived from the interpretation of the whole sentences or the verbs alone.

Therefore, there remain two questions: To what extent semelfactives are repeatable and what kinds of external factors may trigger iteration besides the progressive and durative adverbials?

## Experiment

In order to address these questions, we prepared two types of objects against some of our target verbs. We conducted a questionnaire asking the number of times an action could be repeated. One of the examples is shown in (3).

- Varied objects with the same verbs

- (3) a. *gamu-o*                      *kanda*  
      chewing.gum-ACC    bite-PAST  
      b. *kutibiru-o*                *kanda*  
      lip-ACC                      bite-PAST

The noun *gamu* in (3a) has the characteristic of being chewed (bitten) many times. On the other hand, the noun *kutibiru* in (3b) does not have a characteristic related with the act of biting. Such differences in terms of the characteristics of the object nouns may bring about different numbers of repetition. When the verb takes a noun without a repeatable property as its object, the number of times the action is done would be regarded as once. In the case of objects denoting a repeatable property, the action would be repeated several times. Other items used in the questionnaire are shown below.

- (4) a. *ami-o hiita*  
      net-ACC            pull-PAST  
      b. *kuzi-o hiita*  
      lot-ACC    pull-PAST

- (5) a. *kiiboodo-o utta*  
      keyboard-ACC    type-PAST  
      b. *hoomuran-o utta*  
      home run-ACC    hit-PAST

- (6) a. *bureeki-o funda*  
      break-ACC    step-PAST  
      b. *suteppu-o funda*  
      step-ACC    take-PAST

- (7) a. *kabe-o ketta*  
      wall-ACC    kick-PAST  
      b. *booru-o ketta*  
      ball-ACC    kick-PAST

- (8) a. *te-o tataita*  
      hand-ACC    slap-PAST  
      b. *atama-o tataita*  
      head-ACC    slap-PAST

- (9) a. *origami-o*            *otta*  
       folding paper-ACC    fold-PAST  
    b. *hasi-o*                *otta*  
       chopstic-ACC        fold-PAST

- (10) a. *booru-o*            *nageta*  
        ball-ACC              throw-PAST  
    b. *henkakyuu-o*        *nageta*  
        breaking ball-ACC    throw-PAST

In addition, we prepared two types of verbs against some objects to test the effects of verb semantics. One of the examples is shown in (11).

• Varied verbs with the same objects

- (11) a. *negi-o*              *kitta*  
        scallion-ACC        cut-PAST  
    b. *negi-o*                *kizanda*  
        scallion-ACC        chop-PAST

The verb *kitta* in (11a) simply denotes an action of cutting. By contrast, the verb *kizanda* in (11b) is likely to be interpreted to involve repetition. If this is true, the number would differ depending on the characteristics of the verbs.

Other such items are shown below.

- (12) a. *gita-a-o*            *narasita*  
        guitar-ACC          play-PAST  
    b. *gita-a-o*              *hiita*  
        guitar-ACC          play-PAST

- (13) a. *kyabetu-o*         *kitta*  
        cabbage-ACC        cut-PAST  
    b. *kyabetu-o*            *kizanda*  
        cabbage-ACC        cut-PAST

- (14) a. *denkyuu-ga*        *hikatta*  
        lamp - NOM         light-PAST  
    b. *denkyuu-ga*         *tenmetusita*  
        lamp - NOM         flash-PAST

## Methods

### Participants

The participants were 88 native speakers of Japanese, all of whom were undergraduates at Konan University.

### Procedures

The present experiment was part of a larger questionnaire on semelfactive sentences. The items shown in the last section were presented along with as 39 other sentences not related to the current design. A total of 51 sentences were distributed across 5 pages, which were preceded by an instruction sheet. A question followed each sentence asking how many times the action was repeated. The participants were instructed to write down their answers in natural number. The experiment was a paper-and-pencil questionnaire.

## Results

The results are summarized in Tables 1 and 2. They consist of the median and interquartile range (IQR) of each item. The data for varied objects with the same verbs are shown in Table 1. We can observe that in some cases, the numbers of repetition times were very different depending on the objects. For example, in the cases of *gamu* vs. *kuchibiru*, *kiibodo* vs. *hoomuran* and *origami* vs. *hasi*, the medians of the former were higher than those of the latter (*gamu*=5, *kutibiru*=1; *kiibodo*=10, *hoomuran*=1; *origami*=4, *hasi*=1).

Sentence		Median	IQR
<i>gamu / kutibiru-o</i> 'chewing.gum / lip-ACC	<i>kanda</i> bit-PAST'	5 / 1	17 / 0
<i>ami / kuzi - o</i> 'net / lot	<i>hiita</i> pull-PAST	1 / 1	0 / 0
<i>kiibodo / hoomuran-o</i> 'keyboard / home run-ACC	<i>utta</i> type /hit-PAST'	10 / 1	5 / 0
<i>suteppu / bureeki-o</i> 'step / brake-ACC	<i>funda</i> step / take-PAST'	3 / 1	3 / 0
<i>kabe / booru-o</i> 'wall / ball-ACC	<i>ketta</i> hit-PAST'	1 / 1	0 / 0
<i>te / atama-o</i> 'hand / head-ACC	<i>tataita</i> slap-PAST'	3 / 1	4 / 0
<i>origami / hasi-o</i> 'folding paper / chopstick-ACC	<i>otta</i> hold-PAST	4 / 1	8 / 0
<i>booru / henkakyuu-o</i> 'ball / breaking ball-ACC	<i>nageta</i> throw-PAST'	1 / 1	0 / 0

Table 1: Varied objects with the same verbs

Sentences		Median	IQR
<i>negi-o</i>	<i>kitta / kizanda</i>	5 / 10	9 / 20
scallion-ACC	cut /chop-PAST		
<i>gita-o</i>	<i>narasita / hiita</i>	1 / 8	3 / 21
guitar-ACC	play-PAST		
<i>kyabetu-o</i>	<i>kitta / kizanda</i>	3 / 10	4 / 23
cabbage-ACC	cut-PAST		
<i>denkyuu-ga</i>	<i>hikatta / tenmetushita</i>	1 / 3	1 / 2
lamp-NOM	light / flash-PAST		

Table 2: Varied verbs with the same objects

Also, in the case of varied verbs with the same objects, the medians of the sentences with verbs having repeatable properties were higher than those with verbs without repeatable properties (*kitta* =5, *kizanda* =10; *hiita*=8, *narasita* =1; *hikatta*=1, *tenmetushita*=3).

These results show that repeated interpretations are invoked by the characteristics of the objects in some cases and by the properties of the verbs in others.

### Formal analysis

To account for these results, we adopt Van Geenhoven's (2005) pluractional operator approach to repeated events. One of his pluractional operators is shown below (Van Geenhoven 2005: 113).

$$(15) \quad \lambda V \lambda t \lambda x (\star^t V(x) \text{ at } t) \text{ where } \star^t V(x) \text{ at } t = 1 \\ \text{iff } \exists t' (t' \subseteq t \wedge \star^{t'} V(x) \text{ at } t' \wedge \text{number}(t') > 1 \wedge \forall t'' (t' \subseteq t'' \wedge V(x) \text{ at } t'' \\ \rightarrow \exists t''' (t''' \subseteq t'' \wedge (t''' > t' \vee t''' < t') \wedge V(x) \text{ at } t''' \wedge \exists t'''' (t'''' < t''' < t'' \vee t'''' < t''' < t' \wedge \neg V(x) \text{ at } t'''')))$$

We reinterpret this in terms of event semantics. Furthermore, we introduce number variable  $n$  in the formula to capture the variation in the number of times.

$$(16) \quad \star^{e,n} \pi(e) = 1 \\ \text{iff } \exists e' (e' \subseteq e \wedge \text{number}(e') > n \wedge \pi(e') \wedge \forall e'' (e'' \subseteq e \wedge \pi(e'') \\ \rightarrow \exists e''' (e''' \subseteq e \wedge (e''' > e' \vee e''' < e') \wedge \pi(e'''))))$$

This reads,  $\star^{e,n} \pi(e)$  is true if and only if there are subevents  $e'$  such that  $e'$  is part of  $e$  and the number of  $e'$  is larger than  $n$  and for every  $e''$  that is part of  $e$  and is true of  $\pi$ , there is  $e'''$  such that  $e'''$  is part of  $e$  and  $e'''$  either follows or precedes  $e'$  and  $\pi(e''')$  is true.

We also adopt Pustejovsky's (1995) qualia analysis where a noun may be associated with modal events called TELIC. When a semelfactive such as *kamu* 'to bite' is combined with the object such as *gamu* 'chewing gum' which has a repeated interpretation in the TELIC, the single interpretation of *kamu* is coerced into a repeated one by having the pluractional operator of *gamu* take its scope over the main predicate *kamu*.

(17)

$N=$ <i>kamu</i> ARGSTR= ARG1= x:animate, ARG2= y=N QUALIA= FORMAL =bite(e, x, y)	$N=$ <i>gamu</i> QUALIA=[FORMAL=sweet.food(y) $\wedge$ TELIC= $\star^{e,5}$ bite(e, x, y) $\wedge$ $\neg \exists$ swallow(e <sub>2</sub> , x, y)] $N=$ <i>kuchibiru</i> QUALIA=[FORMAL= a part of body]
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However, when the verb has a pluractional operator in itself, the number of times is determined by the verb.

(18)

$negi$ QUALIA=[FORMAL= food(y) $\wedge$ TELIC= $\star^{e,5}$ cut(e, x, y)]	$M=kizamu$ QUALIA= $\star^{e,10}$ cut(e, x, y) $\wedge$ become.pieces(e <sub>2</sub> , y) $\wedge$ e < <sub>o</sub> e <sub>2</sub> $M=kiru$ QUALIA=cut(e, x, y)
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This analysis captures the fact that repeated interpretations may stem from the characteristics of the object or from the inherent semantics of the verb.

## References

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