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Effects of the inferred affectedness factor in the next-mention preferences in Japanese

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Abstract

This study investigates the interaction between inferences from the event denoted by sentence S_i and the preference for the "next mention" (i.e., what is expected to be mentioned first in the following sentence S_{i+1}), through two off-line experiments. Some previous studies (Stevenson et al., 1994, 2000) argue that event structure and thematic relations play a significant role in the next-mention preferences. We point out that there are conceptual problems about this approach, and argue instead that a theory utilizing non-thematic, finer-grained inference-based factors is called for. Specifically, we suggest that the next-mention preference is significantly affected not necessarily by the event structure in the preceding sentence, but by the speaker/hearer's inferences on the theme argument, e.g., inferences on the extent to which the theme argument is directly or indirectly affected by the event.

Introduction

Pronoun resolution, especially the resolution of subject pronouns, in sentence S_i is often driven by the expectation based on the discourse established by the preceding sentences $S_1...S_{i-1}$. This expectation is particularly influenced by the immediately preceding sentence S_{i-1}. There has been much research on discourse-based inter-sentential strategies that may affect the pronoun resolution, such as centering theories (Grosz et al., 1995), coherence theories (Hobbs, 1979; Kehler, 2002), parallelism accounts (Kameyama, 1996), etc. Among these theories, the coherence theories are more closely related to event semantics than the others are, because coherence relations arise from the eventive interpretations of the two sentences. For example, Kehler (2002) proposes three major types of coherence relations, Resemblance, Cause-Effect and Contingency. Kehler suggests that different coherence relations trigger different pronoun resolution strategies (Kehler, 2002: 154–155). To list just a few examples:

(1) Resemblance
        John kicked Bill. <u>He</u> then punched Bob. [He = John]

(2) Cause-Effect (Implicit causality)
        John accused Bill. <u>He</u> had stolen some money. [He = Bill]

(3) Contingency
        John telephoned Bill. <u>He</u> responded. [He = Bill]

This means that if we conduct a sentence continuation study by simply letting the participants compose the next sentence, the results will vary depending on what coherence relations the participants build in mind (Kehler, 2002; Ueno & Kehler, 2016). Because this factor was highly likely to muddle the goal of the present study, which was to examine the effects of the semantics and pragmatics of the preceding sentence S_{i-1} per se, we controlled for the type of coherence relation the participants could employ, by explicitly using connectives inducing specific coherence relations (Stevenson et al., 1994, 2000; see also Ehrlich, 1980; Kehler, 2002).

An even more lexical-semantic factor for pronoun resolution proposed in the literature is the effect of implicit causality inferred from certain types of verb (Garvey and Caramazza, 1974; Caramazza et al., 1977; McKoon et al., 1993; Rohde, 2008; Rohde et al., 2011). *Accuse* in (2) is a typical example because the cause of accusation is clearly attributed to the object (*Bill* in this case). This property is not seen in a verb like *telephone*: it is not clear who was the cause of the activity of giving a call. The effect of implicit causality is especially prominent when the next sentence is led by connective *because*, because this connective directs the focus to the cause of the event. This contrast is exemplified below (Caramazza et al., 1977):

(4) John telephoned Bill because he ...   [he=John]

(5) John accused Bill because he ... [he=Bill]

Another lexical semantic factor suggested in the literature is the shift of attention focus onto the "endpoint" of the event structure. Stevenson et al. (1994) propose that when a hearer encounters an "event verb" (non-stative verb), he or she constructs a "tripartite mental representation of the action", consisting of (i) a pre-condition, (ii) the action, and (iii) the endpoint/consequence. In terms of theta roles, Patient and Goal correspond to the endpoint, according to Stevenson et al. Unless the next-mention focus is directed toward the cause by a connective like *because*, the focus shifts to the endpoint, e.g., Patient or Goal in the previous sentence (e.g., *Joe hit Patrick, so ...* elicits a continuation starting with *Patrick*). For state verbs, no such "tripartite representation" is constructed, according to Stevenson et al., but still, the default focus is given to the "endpoint", which is Experiencer (e.g., *Joe hated Patrick, so ...* elicits a continuation starting with *Joe*).

Problem

One problem about such an event-structure-based thematic theory of the discourse focus is that it is not clear exactly what "endpoint" means. It is certainly not in the sense of boundedness or telicity as in the literature of lexical aspect à la Vendler (1957), because Patienthood does not necessarily coincide with boundedness or telicity. Stevenson et al. does not provide the list of experimental items, so we cannot fully examine this issue, but their representative item for the Agent-Patient condition was *hit*, which is not a change-of-state verb, and thus is usually not regarded as bounded or telic. Furthermore, it is far from clear what counts as Patient (Rappaport & Levin, 1988; Jackendoff, 1990). For example, does the theta role of the object of *search for* count as Patient? How about the theta role of the object of *meet*? How about the direct object of *thank*? Although we agree with Stevenson et al.'s general idea, we suggest that a categorical approach that makes use of thematic roles may not be the best way to capture the shift of focus, because there are many cases that do not easily fall into typical thematic categorization. We argue that non-thematic, finer-grained pragmatic criteria such as the degree of "awareness" and of "affectedness" can make better predictions about the next-mention preferences. Stevenson et al. (1994: 526) actually define the Patient role as the object "affected" by the action denoted by the verb, but this criterion is categorical. Our point is that a continuous variable such as the "degree" of affectedness and awareness would make better predictions than a categorical variable.

The present study adopted a sentence continuation task, not dealing with pronoun resolution, partly because the pronominal system in our target language, Japanese, is somewhat complicated due to the presence of zero pronoun and is also considerably different from the pronominal system in English and other European languages that many researchers of this topic work on. In our study, participants were asked to continue a sentence fragment by starting it with one of the names mentioned in the previous sentence. This task is similar to the ones employed in previous studies, especially Ueno & Kehler (2016), but as mentioned earlier, the present study focuses exclusively on the next-mention preferences, controlling for the coherence preferences by providing connectives at the beginning of the sentences to be completed, following Stevenson et al. (1994, 2000).

Experiment 1

We first conducted a norming study to measure the strength of certain inferences each verb would trigger. We asked the participants to read simple transitive sentences one by one. These sentences were composed of two-argument psych or action verbs in the past tense and both arguments were human. One of the examples is shown in (6).

(6) *Taroo-ga Akira-o sagasita.*
     Taro-TOP Akira-ACC look.for
     'Taro looked for Akira.'

In (6), the sentence includes two human arguments (*Taro*, *Akira*) and an action verb *sagasita* 'looked for'. Then, we asked the participants to rate the sentences on a five-point scale regarding (i) whether they thought that the person denoted by the direct object (the theme argument) was "aware" of the event or (ii) whether the theme was "affected" by the event.

(7) a.   "awareness"
          Akira-wa sore-ni kizuki masita ka?
          Akira-TOP it-DAT be.aware POLITE Q
          'Was Akira aware of it?'

b. "affectedness"
Akira-wa sore-niyotte eikyoo-o uke masita ka?
Akira-TOP it-by influence-ACC receive POLITE Q
'Was Akira affected by it?'

(7a) is a question of "awareness" and (7b) is a question of "affectedness". In both (7a) and (7b), the direct object "Akira" in (6) was used as the subject. We investigated to what extent the participants thought Akira was aware of or affected by the event.

Methods
The participants were 302 native speakers of Japanese, all of whom were recruited on-line via *Lancers*. The experiment was conducted via Ibex Farm, an on-line hosting service for linguistic experiments. 79 sentences like (6) were prepared. Each participant read 44 items out of the 79 items and rated each sentence on a five-point scale, where 5 in the scale corresponded to "completely agree" and 1 to "completely disagree". Half of the items presented to each participant were accompanied by the "awareness" question and the other half were accompanied by the "affectedness" questions. The materials were pseudo-randomized.

Results and Discussions
The results are summarized in Table 1. We can observe that these ratings depended on the type of verb (psych or action verb). For example, the ratings of action verbs such as *taosita* 'knocked down' (awareness=4.8, affectedness =4.7) and *ketta* 'kicked' (awareness=4.7, affectedness =4.7) were higher than those of psych verbs such as *yumemita* 'dreamt' (awareness=1.4, affectedness =1.5) and *imeejisita* 'imagined' (awareness=1.5, affectedness =1.5). This suggests that psych verbs describe emotions in our minds and basically the subjects do not act on the objects. On the other hand, action verbs directly work on the objects. However, not all verbs could be divided into these two distinctive categories, because there were verbs in the middle of Table 1, such as *niranda* 'looked menacingly at' (awareness=3.6, affectedness =3.4) and *tikazuita* 'approached' (awareness=3.5, affectedness =3.3). This shows that it is not adequate to simply assume a dichotomy between psych and action verbs.

Verb	aware	affected	Verb	aware	affected	Verb	aware	affected
夢見た	1.4	1.5	認めた	3.0	3.2	激怒した	4.3	4.2
イメージした	1.5	1.5	怖がった	3.0	2.8	なだめた	4.3***	3.8
思い出した	1.5	1.7	騙した	3.1	4.4***	訪ねた	4.4*	4.0
尾行した	1.8	2.4	評価した	3.3	3.3	呼んだ	4.4***	3.9
懐かしんだ	1.8	1.9	避けた	3.3	3.3	責めた	4.4	4.3
忘れた	1.9	2.3	見つめた	3.4***	2.6	慰めた	4.5*	4.1
目撃した	1.9	1.9	許した	3.5	3.7	助けた	4.5	4.6
見かけた	2.0*	1.6	追いかけた	3.5	3.8	誘拐した	4.5	4.7
目指した	2.2	2.2	驚いた	3.5	2.8	怒らせた	4.5	4.5
探した	2.2	2.0	近づいた	3.5	3.3	驚かせた	4.5	4.5
見逃した	2.3	2.5	感謝した	3.6	3.6	祝った	4.5***	4.1
見守った	2.3	2.3	にらんだ	3.6	3.4	怒った	4.5	4.5
失望した	2.4	2.7	バカにした	3.8	4.1	忠告した	4.6***	4.0
うらやんだ	2.4	2.3	邪魔した	3.9	4.3	つついた	4.6	4.0
気付いた	2.5	2.1	補佐した	4.0	4.1	告白した	4.7	4.4
憎んだ	2.5	3.2***	従った	4.0	3.2	激怒させた	4.7	4.7
うんざりした	2.6	2.6	非難した	4.0	4.2	招待した	4.7***	3.8
信じた	2.6	3.0*	批判した	4.0	4.0	蹴った	4.7	4.7
恐れた	2.7	2.6	正した	4.0	4.3	襲った	4.7	4.7
理解した	2.7	2.7	楽しませた	4.1	4.5	謝った	4.7***	4.0
信頼した	2.8	3.2*	怖がらせた	4.1	4.4	会った	4.7***	3.8
嫌った	2.8	3.2*	魅了した	4.1	4.1	叩いた	4.7	4.7
尊敬した	2.8	3.1	褒めた	4.1	4.3	刺した	4.8	4.8
見つけた	2.8	2.5	追いついた	4.2***	3.3	殴った	4.8	4.7
怯えた	2.8	2.6	怯えさせた	4.2	4.6	呼びだした	4.8***	4.1
待った	2.9*	2.5	苛立たせた	4.3	4.4	倒した	4.8	4.7
いらついた	3.0	2.7						

Table 1: The ratings of "awareness" and "affectedness"

Experiment 2

In Experiment 1, we found that the distinction between psych and action verbs was not always clear. We hypothesize that non-thematic, inference-based criteria such as the "awareness" and "affectedness" of the object referent may make better predictions about the preference for the shift of focus to the object ("object shift") in the next mention than theta roles, because the latter presuppose the psych vs. action dichotomy, while the former variable is continuous. To test this hypothesis, we conducted a sentence continuation experiment using a subset of the verbs tested in the norming study. We chose 42 verbs with various ratings ("awareness" ranging from 1.4 to 4.8). We used three types of connectives, *dakara* 'so', *sosite* 'and', or *nazenara* 'the reason is', to manipulate the coherence relations. One of the examples is shown in (6).

(8) *Satosi-ga Yuuta-o sagasita.* {*Dakara* / *Sosite* / *Nazenara* } _____.
  Satoshi-TOP Yuta- ACC look.for {So /and / the reason is } _____.
  'Satoshi looked for Yuta. { So / And / The reason is } _____ '

In (8), the context sentence *Satosi-ga Yuuta-o sagasita* contains two possible referents for the subject of the continuation sentence, one being the subject (*Satosi*) and the other being the object (*Yuuta*). We wanted to examine which of the two human arguments would be preferably mentioned as the subject of the next sentence prompted by one of the three types of connectives. Our hypothesis is that the object of the preceding context would be more likely to be selected as the subject of the next sentence if the "awareness" and/or "affectedness" ratings were higher, unless the fragment was prompted by *nazenara* "the reason is".

Methods

Participants were 123 native speakers of Japanese, all of whom were recruited on-line via *Lancers*. The experiment was conducted on Ibex Farm. Materials were constructed using 42 verbs chosen from the norming study and three connectives, as shown in (8). The total of 146 sentence fragments were pseudo-randomly presented to the participants using a Latin-square design. We instructed participants to imagine a natural continuation to the sentence, and to choose either one of the arguments in the context sentence as the subject of the next sentence they would complete.

Results and discussion

We ran correlation and regression analyses to test if the relative frequency of mentioning the object argument first in the continuation ("object shift") was correlated either with (i) the "awareness" ratings, (ii) the "affectedness" ratings, or (iii) the thematic distinction (whether the verb was a psych verb or not). Note that all the psych verbs used in this study had Experiencer subjects (which is typical of Japanese).

We found that all of the three factors were highly correlated with the relative frequency of the object shift. However, the inference-based ratings were slightly better predictors than the thematic distinction: as for the *sosite* ('and') prompt, the correlation coefficients were 0.77 with the affectedness, 0.73 with the awareness, 0.73 with the thematic distinction; as for the *dakara* ('so') prompt, the correlation coefficients were 0.82, 0.81, and 0.78 (Fig1), respectively. When the independent variable was conditionally chosen from either the affectedness rating or the awareness rating (whichever was higher), it was an even better predictor for the *dakara* prompt, in which case the correlation coefficient was 0.84 (Fig2, Table 2). On the other hand, as for the *nazenara* ('the reason is') prompt, we could not find any correlations, as predicted: the correlation coefficients were 0.11 (Fig 3), 0.04 and -0.14. The reason for this was that *nazenara* led the discourse focus to the cause of event while the pragmatic factors we tested were more effect-oriented.
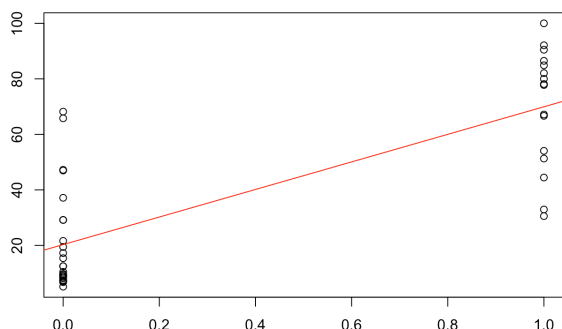

Fig. 1: Correlation between the relative frequency of object shift and the thematic distinction [*dakara* prompt]
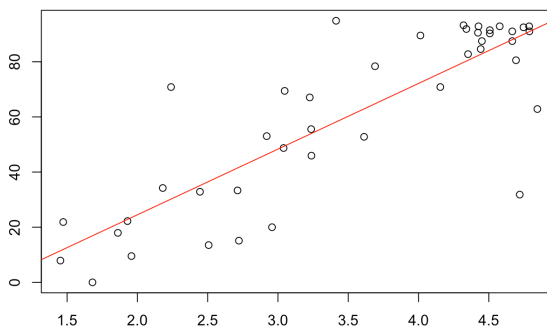

Fig. 2: Correlation between the relative frequency of object shift and the affectedness / awareness ratings (whichever was higher) [*dakara* prompt]
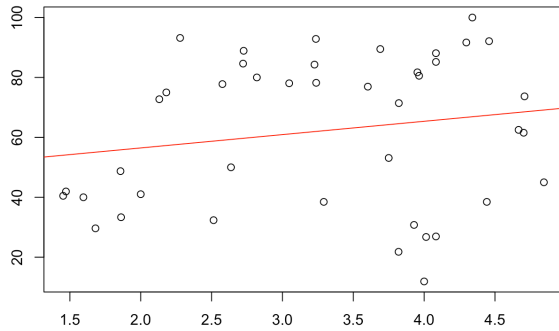
Fig. 3: Correlation between the relative frequency of object shift and the affectedness / awareness ratings [*nazenara* prompt]

Table 2 shows all data points from Fig. 2, including the ratings of "awareness" or "affectedness" (whichever was higher), the relative frequencies of Object Shift, the predicted values from the linear model, and the errors (i.e., the difference between the predicted values and the actual values). "w" points to the verbs whose "awareness" ratings were significantly higher than the "affectedness" ratings (the "awareness" verbs), and "f" points to the verbs whose "affectedness" ratings were significantly higher (the "affectedness" verbs). What is more interesting for us is the "awareness" verbs (such as *tazuneta* 'visited', *syootaisita* 'invited', and *yobidasita* 'summoned'), because they are not typical Agent-Patient action verbs, with less clear event structures. We can see that our inference-based theory managed to make fairly good predictions for these verbs. Our linear model did not make good predictions for some of the psych verbs such as *kiduita* 'noticed' (error = -26.6), *situboosita* 'got disappointed' (error = -26.6), and *iratuita* 'got irritated' (error = -27.3) , for which Stevenson's hypothesis on psych verbs made better predictions (errors = -6.8, -5.2, -0.3, respectively). There were some other verbs (e.g., *sagasita* 'looked for', *atta* 'met') that did not fit well with our linear model or the thematic theory, which we leave open for future research.

To conclude, we argue that the inferences on the object's "affectedness" and "awareness" would be a better predictor of the next mention in the *sosite* and *dakara* prompt than a Patient/Experiencer dichotomy, which is too simplified to make fine-grained predictions, and is theoretically problematic in the first place.

Verb	Rating	Objshift	Predicted	Error	Verb	Rating	Objshift	Predicted	Error
イメージした	1.5	21.9	11.9	9.9	許した	3.7	78.4	64.8	13.6
夢見た	1.5	7.9	11.5	-3.6	批判した	4.0	89.5	72.5	17.1
思い出した	1.7	0.0	16.9	-16.9	追いついた (f)	4.2	70.8	75.9	-5.0
目撃した	1.9	22.2	22.8	-0.6	褒めた	4.3	91.9	80.3	11.6
懐かしんだ	1.9	17.9	21.2	-3.3	なだめた (w)	4.3	93.2	79.8	13.5
見かけた (w)	2.0	9.5	23.5	-14	訪ねた (w)	4.4	82.8	80.6	2.2
目指した	2.2	34.2	28.8	5.4	責めた	4.4	92.9	82.3	10.5
探した	2.2	70.8	30.2	40.6	呼んだ (w)	4.4	90.5	82.2	8.3
うらやんだ	2.4	32.9	35.1	-2.3	騙した (f)	4.4	84.6	82.7	1.9
気付いた	2.5	13.5	36.6	-23.1	祝った (w)	4.5	90.3	84.2	6.0
恐れた	2.7	33.3	41.5	-8.1	怒った	4.5	91.5	84.2	7.2
失望した	2.7	15.1	41.7	-26.6	慰めた (w)	4.5	87.5	82.9	4.6
待った (w)	2.9	53.0	46.4	6.6	忠告した (w)	4.6	92.9	85.9	6.9
怖がった	3.0	48.7	49.3	-0.6	招待した (w)	4.7	87.5	88.0	-0.5
いらついた	3.0	20.0	47.3	-27.3	叩いた	4.7	92.5	90.0	2.5
信じた (f)	3.0	69.4	9.5	20.0	謝った (w)	4.7	80.6	88.7	-8.1
信頼した(f)	3.2	67.1	53.7	13.3	蹴った	4.7	91.0	88.0	3.0
嫌った (f)	3.2	55.6	54.0	1.6	会った (w)	4.7	31.8	89.3	-57.5
憎んだ (f)	3.2	45.9	54.0	-8.1	殴った	4.8	92.9	90.9	1.9
見つめた (w)	3.4	94.9	58.2	6.7	刺した	4.8	62.9	92.3	-29.4
感謝した	3.6	52.8	62.9	-10.2	呼びだした (w)	4.8	91.0	91.0	0.1

Table 2: Verbs, their ratings of "awareness" or "affectedness" (whichever is higher), the relative frequencies of Object Shift, the predicted values from the linear model, and the errors.   (w) = "awareness" verbs; (f) = "affectedness" verbs

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