An Assimilation Effect in Judging the Grammaticality of Sentences Violating the Subjacency Condition: A Further Exploration

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Prior studies have demonstrated anchoring effects in speakers' judgments of grammaticality of sentences which involve a violation of syntactic constraints [Cowart (1994) for binding principle; Nagata (1997 a, 1998) for subjacency condition]. The anchoring effects found in these studies particularly concern a contrast effect in the sense that the judged level of grammaticality of target sentences departs from that of anchor sentences. Nagata (1997 b) has shown also an assimilation effect, i.e., a shift in judgment toward the judged level of grammaticality of anchor sentences. One might claim, however, that the stimulus sentences used included a psychosemantic factor that was irrelevant to syntactic theory, and consequently the attempt fell short of the mark (Cowart, Smith–Petersen & Fowler, 1998). The psychosemantic factor here

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2. The author is grateful to Professor Danny Steinberg for his reading of an earlier version of the paper.
3. Despite Newmeyer's (1983) argument, we have adopted "grammaticality" instead of "acceptability" judgments for the same reason as noted previously (Nagata, 1988).
concerns the property that characterizes one of the two types of sentences used: a subordinate clause in one type presented the internal feeling or attitude of the thematized matrix noun phrase, while that in the other type did not. In this respect, although the two types of sentences violated the subjacency condition, they were distinguished from each other in psychosemantics as well. See Nagata (1997b, 1998) for details.

Nagata (1998) eliminated the psychosemantic factor and instead employed sentences with grammatical violations as in (1) and (2) below. (Subscripts indicate coreference, while \( t \) indicates a trace.)

1. \( \text{Jisatsushita \ otto-ga, tsuma-wa [NP [S \ S t, gonenkan t, issho-ni kurashiteita] toyuu] onna-to] attemita.} \)

   suicide committed husband-SUBJECT wife-TOPIc five years for with
   had lived COMP woman met

   (A wife met a woman who, she heard, had lived for five years with her husband who committed suicide.)

2. \( \text{Gonenkan, tsuma-wa [NP [S' [s jisatsushita \ otto-ga \ t, t, issho-ni kurashiteita] toyuu] onna-to] attemita.} \)

   five years for wife-TOPIc suicide committed husband-SUBJECT with
   had lived COMP woman met

   (A wife met a woman who, she heard, had lived for five years with her husband who committed suicide.)

The above two sentences, according to Sheard (1991), resemble each other in the violation of Chomsky's (1981) subjacency condition, because a subordinate noun phrase, \( \text{jisatsushita \ otto-ga} \), for (1) and a subordinate adverbial phrase, \( \text{gonenkan} \), for (2), move into the initial position of the sentence, thus crossing two barriers, sentence-bar (S') and noun phrase (NP). They differ from each other in which constituent, a noun phrase or
an adverbial phrase (AP), is extracted from a subordinate clause. We shall hereafter designate the type (1) sentences as NP-extracted sentences and the type (2) as AP-extracted sentences.

We presented these two types of target sentences to speakers of Japanese classified as field-dependent, pairing them with the AP-preposed anchors, i.e., the sentences for which an adverbial phrase in a matrix clause was placed in front of the sentences. The AP-preposed anchors were grammatical, although the preposed adverbial phrase was separated from the matrix verb by many intervening sentence constituents. (Note that in Japanese a matrix verb occurs last.) We predicted the assimilation effect when the anchors and targets were similar on the surface syntactic structure. However, the contrast effect was only such that speakers who were given the AP-preposed anchors judged both the NP-extracted and the AP-extracted targets as less grammatical compared to the control speakers given no anchors. Analyses of the AP-preposed anchors indicated that the judged grammaticality of the sentences was so high as to lessen possible influence of the surface similarity between the AP-preposed anchors and the AP-extracted targets.

In the current experiment, we will construct AP-preposed anchors for which a preposed adverbial phrase is associated equally often both with a subordinate verb and with a matrix verb, as in (3) below. (A trace is located in two places to indicate this double association; two different readings are thus given in translation.)

(3) Yokohama-ni, hitobito-wa [NP [S [S doitsu-no kenchikuka-ga t_1 tateta] toyyu] tatemono-o] t_0 miniyattekita.

Yokohama in (to) people-TOPIC German architect-SUBJECT
built COMP building-OBJECT came to see

(People came to see a building which, it was said, a German architect
built in Yokohama.)

(People came to Yokohama to see a building which, it was said, a
German architect built.)

We make this manipulation to increase the similarity between the AP-
preposed anchors and the AP-extracted targets, but not to such an extent
that the AP-preposed anchors profoundly violate the subjacency condition
as do the AP-extracted targets. In so doing, we aim not only to decrease
the judged level of grammaticality of the AP-preposed anchors—as
compared to that of the previous AP-preposed anchors (Nagata, 1998)—
but also to further the possibility that the anchors would draw the judged
level of grammaticality of target sentences toward their own level of
judged grammaticality.

Also in this experiment, participants are those classified as field-
dependent. The participants given the AP-preposed anchors judge both
the grammaticality of the NP-extracted and the AP-extracted targets
and then their judgments are compared to those given no anchors. Since
the AP-preposed anchors are constructed to be more similar on the
surface to the AP-extracted targets than are those in our previous
experiment, the effect of surface similarity is expected to be greater than
in the previous experiment. If it is to be posited again that speakers
classified as field-dependent are likely to make more use of immediate
external information (Gooddenough, 1976; Witkin & Goodenough, 1977;
Witkin, Goodenough, & Oltman, 1979; Witkin & Goodenough, 1981),

4. In Japanese, the postpositional particle, *ni*, includes the meaning of place or
direction.
including, we expect, the surface similarity between the anchors and the targets, we could put forth the following predictions: (1) No difference will be found for the judgments of grammaticality of the AP-extracted targets between participants given the AP-preposed anchors and control participants given no anchors (assimilation effect), and (2) Participants given the anchors will judge the NP-extracted targets as less grammatical than the control participants, a contrast effect due to the dissimilarity between the anchors and the targets.

Method

Stimulus Sentences. Two types of sentences were used, target and anchor. The target sentences consisted of 30 root sentences involving two clauses, matrix and subordinate. Two types of target sentences, each violating the subjacency condition, were constructed from the 30 root sentences. For one set of 30 items, a noun phrase serving as a subject in the subordinate clause was extracted and placed in front of the sentence (NP-extracted targets), while for the other set of 30 items an adverbial phrase in the subordinate clause was extracted and placed likewise (AP-extracted targets). The two sets of sentences differed only in which constituent, a noun phrase or an adverbial phrase, was extracted from the subordinate clause, with all the sentence constituents otherwise kept identical. A separate survey of 63 university students, 22 women and 41 men (mean age: 21.8 yr.), had established that each adverbial phrase extracted was associated with its corresponding subordinate verb significantly more often than with its corresponding matrix verb.

Two lists of 30 targets were prepared with the constraint that each
list contained 15 NP-extracted items and 15 AP-extracted items and that each list contained each root sentence.

For anchors like the sentence in (3) above, the survey provided only 15 sentences for which each preposed adverbial phrase was associated equally often both with the subordinate and with the main verb. Accordingly, these 15 anchors were used twice in order to pair them with the 30 targets.

*Embedded Figures Test.* The Sawa-Gottschaldt Test (Sawa, 1966) was used to classify speakers as field–dependent. See Nagata (1992) for the actual embedded figures and testing procedure used. A total of 106 students were administered this test, 77 from Okayama University and 29 from the Kawasaki University of Medical Welfare. Their scores ranged from 5 to 46 items discovered ($M = 23.65, SD = 7.01$). From the 106 participants, 28 participants, with scores ranging from 5 to 20, were categorized as field–dependent and assigned to the two groups such that mean scores and $SD$s for the two groups were as identical as possible (Anchor–present: $M = 15.36, SD = 3.96$; Anchor–absent: $M = 15.50, SD = 3.96$) and such that each group would involve approximately equal percentages of participants drawn from the two different universities.

*Participants.* Twenty-eight female students participated in a grammaticality judgment task. They ranged in age from 18 to 19 yr. (mean age: 18.4 yr.) and were all native speakers of Japanese.

*Design.* A $2 \times 2$ factorial design included anchor sentences (Present, Absent) and target sentences (NP-extracted, AP-extracted). The second was a within–participants variable. Each group contained 14 participants.

*Procedure.* Stimulus sentences were given in a booklet form (14 cm
Two types of booklets were prepared, with each type corresponding to its respective experimental condition. One group of participants was given 30 anchors; the other group was given no anchors. Half of the participants in each group judged one list of 30 targets, 15 NP-extracted and 15 AP-extracted sentences, while the other half judged the other list of 30 targets.

On each page of a booklet which was delivered to the participants who were given anchors, the anchor sentence and the target sentence were presented together, with the anchor presented above the target. Each page also displayed a 7-point scale, shown above the two sentences. Participants who were given anchor sentences were required to judge the relative grammaticality of both the anchor and the target sentences on the 7-point scale. Participants were told that grammatical sentences were defined as those correctly expressed in Japanese, while ungrammatical sentences were those which were incorrectly expressed. If they thought a sentence grammatical, they gave it a score of 1. If they thought a sentence ungrammatical, they rated the degree of ungrammaticality by assigning it a number from 2 (least ungrammatical) to 7 (most ungrammatical). They wrote a response number within the parentheses which followed each sentence. Each participant who was given anchors judged a total of 30 pairs of anchor and target sentences. The order of presentation of these two types of sentences was randomly determined. Thus each participant was given randomly created pairs of anchor and target sentences.

The control participants, who were given no anchors, were required to do an arithmetic task instead of judging the anchor sentences. Specifically, they were given two randomly generated three-digit
numbers and asked to add them. They also judged the 30 target sentences, each paired with one calculation problem. The presentation of the target sentences was again randomized for each control participant.

Each booklet consisted of 31 pages. The first page of the booklet instructed the participants on how to judge the grammaticality of sentences and on how to use the 7-point rating scale. For practice, the participants given anchors judged two sample sentences, while those given no anchors made instead one calculation and one judgment of grammaticality.

Results and Discussion

Analyses were done in two ways. Scores were first averaged across items and participants were treated as a random variable (Participant analysis: $M_1$, $SD_1$, $t_1$, $F_1$). Second, scores were averaged across participants and items were treated as a random variable (Item analysis: $M_2$, $SD_2$, $t_2$, $F_2$).

The mean judgment for the anchors was 2.50 ($SD_1 = .57$; $SD_2 = .78$). This score was greater than that obtained in the previous study (Nagata, 1998: $M = 1.54$; $SD_1 = .60$; $SD_2 = .40$, $t_1(43) = 5.03$, $p < .001$; $t_2(43) = 5.33$, $p < .001$), indicating the success of the present manipulation.

Table 1 presents the mean and $SD$ of judgments in each condition. A 2 (anchors: Present, Absent) x 2 (targets: NP-extracted, AP-extracted) analysis of variance was performed, with targets treated as a within-participants variable. Analyses showed both the effects of anchors [$F_2(1, 58) = 9.53$, $p < .01$] and targets [$F_1(1, 26) = 63.00$, $p < .001$, $F_2(1, 58) = 40.04$, $p < .001$]. Subsequent Tukey's tests ($p < .05$) showed that
irrespective of the presence of anchors, NP-extracted sentences were judged as being less grammatical than AP-extracted sentences, consistently with our previous findings (Nagata, 1998).

Our prediction as to judged grammaticality was supported by the Item analysis. Thus, participants given anchors judged the NP-extracted targets as less grammatical than those given no anchors, while no difference was found between the two groups of participants for the judgments of the AP-extracted targets. By Participant analysis, on the other hand, participants given anchors judged the targets as less grammatical than those given no anchors, irrespective of the targets judged. In this respect, the assimilation effect found here was not as pronounced as found in the previous experiment (Nagata, 1997b). This may have been due to the weakness of the manipulation which made the AP-preposed anchors and the AP-extracted targets similar in surface structure.

It is indeed the case that at least by Item analysis no difference was found between the participants given the anchors and those not given.

Table 1  Judgments of Grammaticality of Target Sentences on a 7-point Scale
(1 = grammatical, 7 = least grammatical)

<table>
<thead>
<tr>
<th></th>
<th>Anchor Absent</th>
<th>Anchor Present</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NP-extracted</td>
<td>AP-extracted</td>
</tr>
<tr>
<td>Participant analysis (n=14)</td>
<td>4.21</td>
<td>3.30</td>
</tr>
<tr>
<td>M1</td>
<td>1.13</td>
<td>.95</td>
</tr>
<tr>
<td>SD1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item analysis (n=30)</td>
<td>4.21</td>
<td>3.31</td>
</tr>
<tr>
<td>M2</td>
<td>.53</td>
<td>.62</td>
</tr>
<tr>
<td>SD2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. NP-extracted: Noun phrase extracted sentences; AP-extracted: Adverbial phrase extracted sentences.
them when they judged the AP-extracted sentences. However, by Participant analysis the contrast effect instead of assimilation effect was found. When considering the contrast found for the judgments of both the AP-extracted and the NP-extracted targets, it may be the level of judged grammaticality of the anchors rather than the surface similarity between the anchors and the targets that have actually produced the contrast effect in this experiment. The contrast effect found here was not as pronounced as in our previous experiments (Nagata, 1997a, 1998). This again seems to be due to our present manipulation. Specifically, in this study we intentionally created AP-preposed anchors for which two different readings were possible. The manipulation, however, inevitably decreased the judged level of grammaticality of the anchor sentences, providing the condition not sufficient to produce a marked contrast effect. Note that considerable difference had been created between anchor and target stimuli in our previous studies involving sentences (Nagata, 1992, 1997a) as well as in traditional ones involving other perceptual stimuli (e.g., Helson, 1964; Helson & Kozaki, 1968). We cannot rule out the surface structure similarity for producing the assimilation effect. Further studies, however, are needed in order to establish its role in producing the anchoring effect, an assimilation effect in particular.

In short, the present manipulation of surface structure similarity between anchor and target sentences was not found to be sufficient to produce a clear assimilation effect. Instead, the level of judged grammaticality of anchors appears more influential in that it yielded a contrast effect in judging sentences.
References


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This study explored an assimilation effect in judging the grammaticality of sentences violating the subjacency condition. The target sentences included either a noun phrase (NP–extracted) or an adverbial phrase (AP–extracted), each extracted from a subordinate clause and placed in front of the sentences. Anchor sentences had a surface structure similar to the AP–extracted targets such that a preposed adverbial phrase could be associated both with the subordinate and the matrix verb. Twenty-eight speakers classified as field–dependent judged the two types of target sentences given together with anchors or no anchors. The assimilation as well as the contrast effect was found, albeit to a slight degree. The level of judged grammaticality of the anchors rather than surface structure similarity appeared to be more influential in producing the anchoring effects in the judgments of the grammaticality of sentences.