Expectation-Driven Facilitation in Japanese: its Independence from Distance
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Synopsis: We designed an experiment with Japanese interrogative sentences, and show that the expectation-driven facilitation and the locality-driven difficulty are independently observed even when both of the dependencies are simultaneously terminated by the single word (V+ka). In sum, we suggest that the parser handles a dependency with a syntactic wh-feature and that with lexical/semantic information separately, even when they were encoded in the same lexical item.

Introduction: Expectation plays an important role for the incremental processing (Stowe, 1986; De Vincenzi, 1991; Aoshima, et al., 2004, Delong, et al., 2005, among others). Building on a rich context and more constituents in a structure, the parser can sharpen its expectation for what to see in the sentence (the expectation-driven facilitation; Konieczny & Döring, 2003, Hale, 2001; Levy, 2008). At the same time, a longer dependency length between the elements increases the integration cost (the locality-driven difficulty; Grodner & Gibson, 2005; Lewis & Vasishth, 2005). Husain, et al. (2014) found that the strong expectation effect cancels the distance effect. The distance effects disappear when an object strongly tied to the verb was used. They manipulated the dependency length by adding extra adverbials, and it raises some concern of altering the prediction of the particular verb. Staub (2010), on the other hand, observed the independence of the expectation and locality effects, but he evaluated those effects with the different elements in the different positions. It is rather preferable to examine the effect in the same region if the interaction of those effects is at issue. We designed an experiment using Japanese interrogative sentences, in order to examine whether the expectation and locality interact each other, without involving problems discussed above.

Self-paced Reading Experiment: In a 2×2 factorial design, expectation (Strong (ab) vs. Weak (cd)) × distance (Distant (ac) vs. Local (bd)) were manipulated. We manipulated the content of the PP (NP-de) to modulate the expectation strength with respect to the verb content. For example, in (ab), the verb ‘knit’ is strongly predicted when the object ‘glove’ was combined with a PP ‘with stick needles’. Furthermore, in the Distant conditions, an adjunct clause intervened between the object Wh-phrase and the verb.

We found that there was a main effect of distance at the embedded verb region ‘knitted-Q’, the mean reading times in the distance conditions being slow, compared to those in the local conditions ($\beta=39.39$, $t=2.62$, $p<.02$). There was also a main effect of expectation at the spillover region ‘to her grand-daughter’; the mean reading times in the strong expectation conditions were faster than those in the weak expectation conditions ($\beta=21.58$, $t=2.73$, $p<.01$). There was no interaction of the factors.

The result clearly indicated that the two factors manipulated in our experiment did not interact, but were independent from each other. We suggest that while the processing of the syntactic Wh-feature is handled separately from the processing of lex/sem information of the verb. Although the single word, the verb with the Q-particle, terminates the dependency formation, the effects were separately observed with different timings.
Target sentences

the inserted adjunct clause = [sinseki-no kekkon-ga tikazuita tokini]
relative-GEN marriage-NOM get.close when
‘when the marriage of the relative gets closer’

(a) STRONG EXPECTATION, DISTANT
Sobo-wa gikei-ga boobari-de dono-tebukuro-o [adjunct clause]
grandma-TOP sister.inlaw-NOM stick.needle-by which-glove-ACC
yorokonde andano-ka magomusume-ni tazuneta
happily knitted-Q grand.daughter-to asked

‘When the marriage of the relative gets closer, the grandma asked to her granddaughter which gloves her sister-in-law knitted by the stick needle.’

(b) STRONG EXPECTATION, LOCAL
Sobo-wa gikei-ga boobari-de [adjunct clause] dono-tebukuro-o
grandma-TOP sister.inlaw-NOM stick.needle-by which-glove-ACC
yorokonde andano-ka magomusume-ni tazuneta
happily knitted-Q grand.daughter-to asked

(c) WEAK EXPECTATION, DISTANT
Sobo-wa gikei-ga zisitu-de dono-tebukuro-o [adjunct clause]
grandma-TOP sister.inlaw-NOM own.room-in which-glove-ACC
yorokonde andano-ka magomusume-ni tazuneta
happily knitted-Q grand.daughter-to asked

‘When the marriage of the relative gets closer, the grandma asked to her granddaughter which gloves her sister-in-law knitted in her own room.’

(d) WEAK EXPECTATION, LOCAL
Sobo-wa gikei-ga zisitu-de [adjunct clause] dono-tebukuro-o
grandma-TOP sister.inlaw-NOM own.room-in which-glove-ACC
yorokonde andano-ka magomusume-ni tazuneta
happily knitted-Q grand.daughter-to asked

Summary of reading times at the critical regions (ms; SE in parentheses)

<table>
<thead>
<tr>
<th>Region 10</th>
<th>(a) Strong × Dis</th>
<th>(b) Strong × Loc</th>
<th>(c) Weak × Dis</th>
<th>(d) Weak × Loc</th>
</tr>
</thead>
<tbody>
<tr>
<td>verb - ka</td>
<td>727 (26)</td>
<td>731 (30)</td>
<td>626 (20)</td>
<td>672 (21)</td>
</tr>
<tr>
<td>Region 11</td>
<td>spillover</td>
<td>636 (18)</td>
<td>674 (23)</td>
<td>613 (18)</td>
</tr>
</tbody>
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