

Effects of Syntactic Information on Ambiguous Japanese Verbs in Sentence Comprehension Using a Cross-modal Priming Task

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This research demonstrates syntactic effects in Japanese, an S-O-V language, based on the constraint-based lexicalist approach (MacDonald, et al., 1994)¹ In particular, the effect of a post-positional particle on the semantic access of sentence-final ambiguous verbs in two kinds of sentences, (a) S-ga-V sentences (subject, subjective postpositional particle, and ambiguous verb) and (b) O-wo-V sentences (object, objective post-positional particle, and ambiguous verb), will be demonstrated. A cross-modal priming paradigm was used in which a target noun was visually presented one-syllable before the end or immediately after the end of a sentence-final verb presented auditorily. One target was related to the verb in the S-ga-V sentence, another target was related to the verb in the O-wo-V sentence, and a third target was unrelated.

Method

Subjects. Sixty undergraduate students were randomly assigned to two groups of equal size. All were native Japanese speakers.

Experimental Design. The two groups differed in the ISIs between an ambiguous verb (a prime word), which is the final word of an auditorily presented sentence, and a visually presented target word. In the first group (the N-ISI condition), the target was presented one syllable before the end of the ambiguous verb (mean ISI = -126 ms, $SD=32$). In the second group (the 0-ISI condition), the target was presented immediately after the ambiguous verb. The within-group factor was the relatedness between the ambiguous verb and the target word based upon the word-association norms of ambiguous verbs in Japanese. This factor consists of the syntactically and semantically related condition, the semantically related condition and the unrelated condition.

Materials. Eighteen ambiguous verbs that can take both subjective and objective postpositional particles were selected from the norm, in which subjects wrote words corresponding to a given ambiguous verb alone, or presented with a postpositional particle. These verbs have two, three or four syllables (mean = 3.06, $SD=.73$).

Based on preliminary research, thirty-six S-ga-V and O-wo-V sentences were constructed as auditory stimuli. These subject and object words were not semantically related to the prime or the target words.

¹ I thank Alan H. Kawamoto for helpful comments.

Apparatus. The experiment was controlled by two 486 CPU computers (NEC PC-9801 FA). Auditory stimuli were digitally recorded by a female speaker and later presented from a SONY headphone using a 16-bit sound card with 16 kHz digital sampling. Each naming response was recorded using a voice key and a SONY DAT.

Procedure. Subjects were instructed to comprehend the sentence that was presented from the headphone, and to read quickly and accurately the word that was presented on the computer screen.

Results and Discussion

The mean naming latency and its SD for each experimental condition are shown in Table 1. All pronunciation errors were truncated from the data analysis. The naming latency data were subjected to a mixed two-way ANOVA. Only the main effect of the prime-target relatedness was significant ($F(2,116)=51.53, p<.001$). Tukey's WSD multiple comparisons showed that the syntactic and semantic condition was significantly faster than the semantic condition ($p<.01$). Furthermore, these two conditions were significantly faster than the unrelated condition (both $p<.01$).

These priming effects demonstrate that, one syllable before the end of an ambiguous verb and immediately after the presentation of an ambiguous verb, both the syntactically-related and syntactically-unrelated semantically relevant words are activated, but the activation levels of syntactically related targets are higher than those of syntactically-unrelated targets.

Table 1. Means for naming latencies (with SD , in ms).

	Condition	Mean (SD)	Priming
N-ISI	Syntactic & Semantic	506 (65)	58
	Semantic	530 (65)	35
	unrelated	564 (112)	
0-ISI	Syntactic & Semantic	533 (90)	49
	Semantic	553 (92)	29
	unrelated	582 (94)	

References

- MacDonald, M.C., Pearlmuter, N.J., & Seidenberg, M. S. (1994). Lexical nature of syntactic ambiguity resolution. *Psychological Review*, 101, 673-703.