

Similarity-based interference in processing Japanese quantifier floating constructions

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It has been argued whether **similarity-based interference**—where a **distractor** similar to the **target** argument of a head interferes with dependency formation—is triggered proactively (a new item interferes with the retrieval of an old item from working memory WM; proactive interference, **PI**) or retroactively (an old item interferes with the input of a new item into WM; retroactive interference, **RI**) [1]. PI and RI can be operationalized by reversing the order of distractor and target: PI (**distractor-target-head**), RI (**target-distractor-head**). [1] reported larger negative effects for the RI than for the PI condition in English, and [2] found a similar pattern for positive effects in Chinese. To generalize this pattern, the present study conducted two **Japanese** eye-tracking experiments, comparing reading times in the RI (Experiment I) and PI (Experiment II) using **quantifier floating constructions**.

Method. Native Japanese speakers participated in Exps. I (n=45) and II (n=40). 24 sets of sentences were constructed by manipulating the congruency of the distractor and target with the quantifier (Q) in the RI condition (1). Sentences for the PI condition were constructed by reversing the order of target and distractor in each sentence (2). In each trial, a sentence was presented in its entirety on a monitor, followed by a comprehension question.

Analysis. Total reading times, and regression path times from the two experiments were analyzed using linear mixed-effects models, with Interference Type (RI vs. PI), Target (congruent vs. incongruent with the head), Distractor (congruent vs. incongruent with the head) as fixed factors.

Results. At the head (Q) region, a significant interaction between Target and Distractor was observed. In the RI condition, the incongruent-target & congruent-distractor condition (2c) yielded significantly shorter total reading times than the incongruent-target & incongruent-distractor condition (2d). In contrast, in the PI condition, no significant difference was observed between the corresponding conditions. For regression path times, a significant interaction between Distractor and Interference Type was observed. In the RI condition, the incongruent-target & congruent-distractor condition (2c) showed significantly shorter regression path times than the incongruent-target & incongruent-distractor condition (2d), whereas no such difference was observed in the PI condition.

Discussion. The present findings extend evidence for retrieval-based similarity interference to Japanese floating quantifier constructions and suggest that retroactive interference is the dominant mechanism underlying dependency formation, being consistent with [1] and [2].

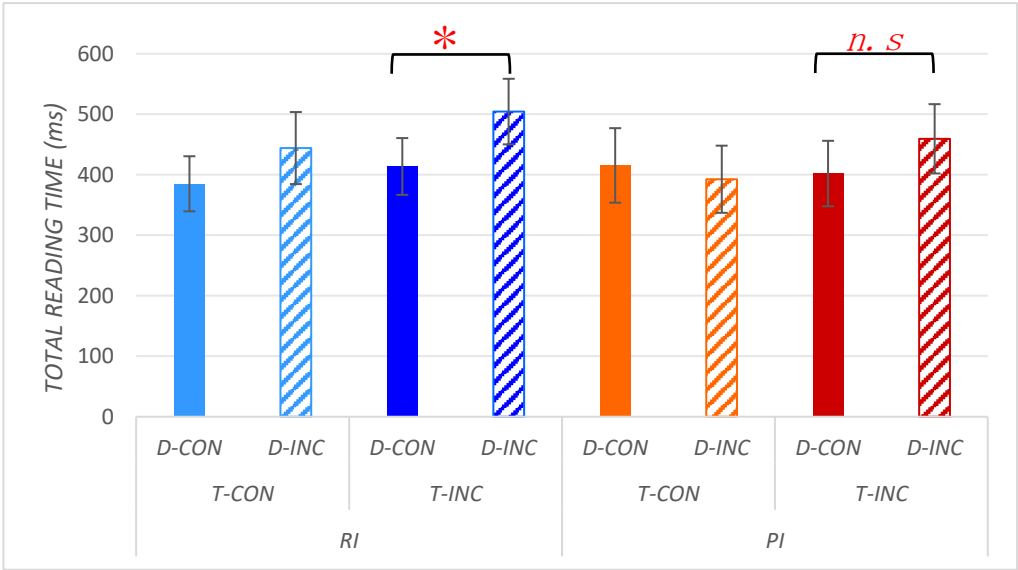
References

[1] Van Dyke, J. A., & McElree, B. (2011). Cue-dependent interference in comprehension. *Journal of Memory and Language*, 65(3), 247–263.

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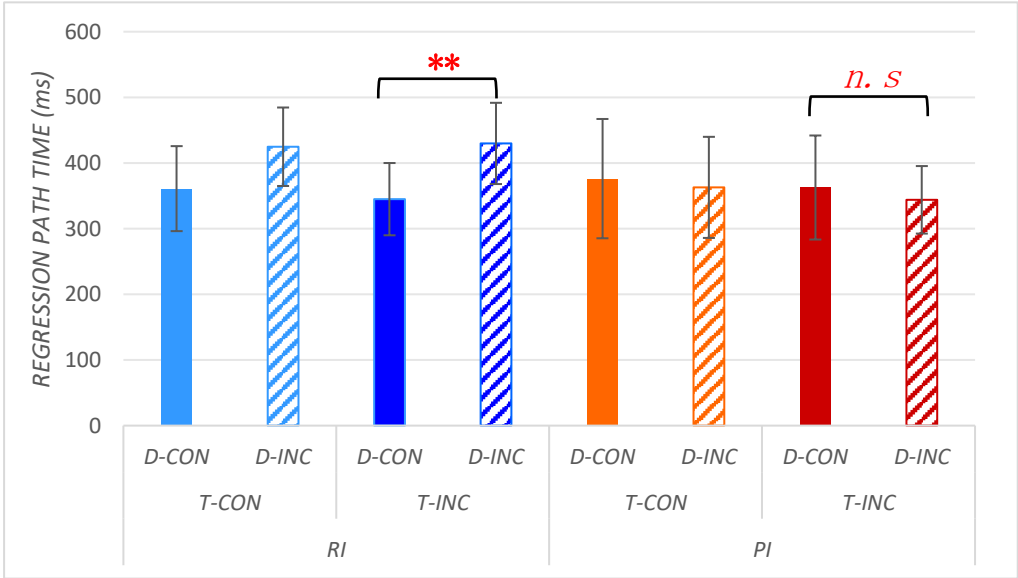
Figures and Tables

Figure 1: Mean total reading times for target and distractor in/congruent with the head



*: $p < 0.05$ The error bars indicate the 95% confidence intervals.
Note: D distractor, T target, CON and INC D- or T- is congruent / incongruent with the head.

Figure 2: Mean regression path times for target and distractor in/congruent with the head



Japanese Quantifier Floating and Sample Sentences

In Japanese, numeral quantifiers consist of a numeral and a classifier (**CL**), and they may appear separated from the noun they quantify. This phenomenon is known as **quantifier floating (FQ)**. In (1) and (2), the head of the FQ is the classifier *-tou*, which is used for large animals such as sea turtles and whales. FQs modify the object in active clauses and the subject in passive clauses. (1) and (2) are passive sentences, and the subject (NP1) is the legitimate associate with the FQ as head. When the object (NP2) is a large animal, it may incorrectly attract the head. NP1 serves as the **target**, and NP2 as the **distractor**. In grammatical passive sentences the subject (NP1) must be syntactically and semantically congruent with the head. The present study manipulated the semantic congruency of the T and D with the CL and constructed four sentence types (a to d) for the RI and PI conditions.

(1) The RI condition

NP1 (target)-nom /NP2 (distractor)-dat /numeral-CL (FQ, head)/ Adv / V-PASS

- a. *Shimauma-ga*^{R1} / *raion-ni*^{R2} / *ni-tou*^{R3} / *shitsukoku*^{R4} / *nerawarete-iru.*^{R5}
zebra-NOM lion-DAT two-CL persistently target-PASS-PROG
[+large animal] [+large animal] [+large animal]
'The zebra is persistently being targeted by two lions.'
- b. *Shimauma-ga*^{R1} / *hantā-ni*^{R2} / *ni-tou*^{R3} / *shitsukoku*^{R4} / *nerawarete-iru.*^{R5}
zebra-NOM hunter-DAT two-CL persistently target-PASS-PROG
[+large animal] [+large animal]
'The zebra is persistently being targeted by two hunters.'
- c. *Niwatori-ga*^{R1} / *raion-ni*^{R2} / *ni-tou*^{R3} / *shitsukoku*^{R4} / *nerawarete-iru.*^{R5}
chicken-NOM lion-DAT two-CL persistently target-PASS-PROG
[+large animal] [+large animal]
'The chicken is persistently being targeted by two lions.'
- d. *Niwatori-ga*^{R1} / *hantā-ni*^{R2} / *ni-tou*^{R3} / *shitsukoku*^{R4} / *nerawarete-iru.*^{R5}
chicken-NOM hunter-DAT two-CL persistently target-PASS-PROG
[+large animal]
'The chicken is persistently being targeted by two hunters.'

(2) The PI condition

NP2 (distractor)-dat /NP1 (target)-nom /numeral-CL (FQ, head)/ Adv / V-PASS

- a. *Raion-ni*^{R1} / *shimauma-ga*^{R2} / *ni-tou*^{R3} / *shitsukoku*^{R4} / *nerawarete-iru.*^{R5}
lion-DAT zebra-NOM two-CL persistently target-PASS-PROG
[+large animal] [+large animal] [+large animal]
'The zebra is persistently being targeted by two lions.'
- b. *Hantā-ni*^{R1} / *shimauma-ga*^{R2} / *ni-tou*^{R3} / *shitsukoku*^{R4} / *nerawarete-iru.*^{R5}
hunter-DAT zebra-NOM two-CL persistently target-PASS-PROG
[+large animal] [+large animal]
'The zebra is persistently being targeted by two hunters.'
- c. *Raion-ni*^{R1} / *niwatori-ga*^{R2} / *ni-tou*^{R3} / *shitsukoku*^{R4} / *nerawarete-iru.*^{R5}
lion-DAT chicken-NOM two-CL persistently target-PASS-PROG
[+large animal] [+large animal]
'The chicken is persistently being targeted by two lions.'
- d. *Hantā-ni*^{R1} / *niwatori-ga*^{R2} / *ni-tou*^{R3} / *shitsukoku*^{R4} / *nerawarete-iru.*^{R5}
hunter-DAT chicken-NOM two-CL persistently target-PASS-PROG
[+large animal]
'The chicken is persistently being targeted by two hunters.'