

Proactive Interference in Anaphoric Dependency Resolution: Evidence from Chinese

Zhong Chen

Rochester Institute of Technology, USA

z.chen@rit.edu



I. Introduction

- Resolving reflexive-antecedent dependencies requires the parser to consult syntactic constraints like C-command within the binding domain (Sturt 2003; Xiang et al. 2009; Dillon et al. 2013).
- The syntactically correct **retrieval target** is sometimes accompanied by one or more syntactically unlicensed retrieval candidate(s) as **distractor(s)**.
- The retrieval target can also be accessed by matching non-syntactic cues such as gender and animacy (Badecker & Straub 2002; Felser et al. 2009; Cunnings & Felser 2013).

II Interference Type

- Experimental evidence supporting cue-based retrieval (Lewis & Vasishth 2005) often comes from the interference effect.
- Distractors can appear between the target and retrieval site or before the target:
 - Retroactive Interference: Antecedent Distractor Reflexive
 - Proactive Interference: Distractor Antecedent Reflexive
- The majority of previous studies focused on retroactive interference. (c.f. Van Dyke & McElree, 2006; Cunnings & Felser, 2013)

III. Experiment

- A self-paced reading experiment with 60 native Mandarin Chinese speakers.
- Four experiment conditions in a 2 × 2 factorial design. 24 sets of conditions; 26 fillers with argument reflexive Ziji or its compound form Ta-Ziji (himself, herself) at various places in a sentence; 70 other fillers.
- A long-distance binding exists between Ziji and its antecedent. Embedded subjects are inanimate and are not candidates for retrieval. Chen, Jäger and Vasishth (2012) found the interference effect at Ziji and following regions in non-local conditions.
- The distractor and the retrieval target are in the same item sentence (c.f. Jäger, Engelmann & Vasishth, 2015).
- Distractors, either **animate** or **inanimate**, locate within a temporal phrase and appear either before or after the retrieval target.

Experiment Conditions

A. RETROACTIVE, **Inanimate** DISTRACTOR:

Fanduipai-lingxiu | biaoshi | [zhege-shengming { zai | **kangyi** | shikong | deshihou } | zhemo-le | **Ziji** | zhengzheng | santian] ...
Opposition-leader | indicate | this-announcement | at | **protest** | out of control | time | tortured | **self** | whole | three-days ...
“The opposition leader indicated that this announcement had tortured him for three days when the protest was out of control ...”

B. RETROACTIVE, **Animate** DISTRACTOR:

Fanduipai-lingxiu | biaoshi | [zhege-shengming { zai | **kangyizhe** | shikong | deshihou } | zhemo-le | **Ziji** | zhengzheng | santian] ...
Opposition-leader | indicate | this-announcement | at | **protester** | out of control | time | tortured | **self** | whole | three-days ...
“The opposition leader indicated that this announcement had tortured him for three days when the protester was out of control ...”

C. PROACTIVE, **Inanimate** DISTRACTOR:

{ Zai | **kangyi** | shikong | deshihou } | **fanduipai-lingxiu** | biaoshi | [zhege-shengming | zhemo-le | **Ziji** | zhengzheng | santian] ...
At | **protest** | out of control | time | **opposition-leader** | indicate | this-announcement | tortured | **self** | whole | three-days ...
“When the protest was out of control, the opposition leader indicated that this announcement had tortured him for three days ...”

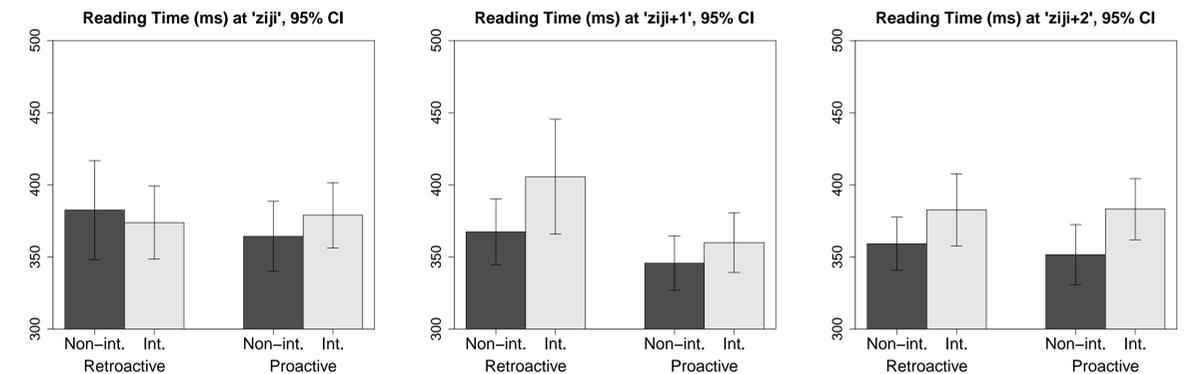
D. PROACTIVE, **Animate** DISTRACTOR:

{ Zai | **kangyizhe** | shikong | deshihou } | **fanduipai-lingxiu** | biaoshi | [zhege-shengming | zhemo-le | **Ziji** | zhengzheng | santian] ...
At | **protester** | out of control | time | **opposition-leader** | indicate | this-announcement | tortured | **self** | whole | three-days ...
“When the protester was out of control, the opposition leader indicated that this announcement had tortured him for three days ...”

IV. Results

- A linear mixed model (Bates & Sarkar, 2007) was fitted with items and participants as crossed random effects.
- The similarity-based interference and the linear order between distractor and Ziji (Interference Type) are treated as fixed effects.
- The interaction between the two fixed effects indicate whether the interference type interacts with the interference effect size.
- Reading times in three critical regions were analyzed: Ziji and two segments after Ziji.
- 2.89% data points that are either smaller than 100 ms or larger than 2000 ms are trimmed as outliers.
- Answers to comprehension questions have a 87.3% accuracy rate. No significant effect found in answers' latencies.

Analysis Results



Interference	t = 0.1	t = 1.5	t = 2.4
LINEAR ORDER	t = -0.1	t = -2.2	t = -0.3
INTERACTION	t = 1.0	t = -0.4	t = 1.1

- At the word after Ziji, we found a significant effect of linear order: retroactive conditions (A & B) were read slower than proactive ones (C & D). This is predicted by cue-based retrieval models like ACT-R (Lewis & Vasishth, 2005) since the activation of antecedent decays when more materials, including the distractor, intervene between antecedent and the reflexive.
- The main effect of interference achieved statistical significance two words after ziji. Conditions with an animate distractor “protester” (B & D) were read slower than those with an inanimate distractor “protester” (A & C).
- There was no evidence for an interaction between interference effect sizes and the linear order of distractor–retrieval target. The distractor within a sentence-initial adjunct may be prominent enough to make up for the reduced interference due to its longer distance to the retrieval site “Ziji” (c.f. the refined ACT-R model (Engelmann, Jäger & Vasishth, submitted)).

V. Conclusions

- These results are in support of cue-based retrieval in resolving anaphoric dependencies. The animacy feature match between the distractor and Ziji leads to additional processing difficulties.
- Even when the distractor appears before the antecedent, the proactive interference increases the processing time of Ziji.
- No interaction between the distractor location and the interference effect size asks for further investigation of the role of distractor prominence in similarity-based interference.

References

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