The effect of syntactic constraints on the processing of Chinese cataphora

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Chinese overt pronouns should not cyclic c-command their antecedent (Huang,1982), and so they can only have a disjoint reading in a backward anaphora (1). Given previous works showing that the active search of an antecedent of a pronoun is restricted by grammatical constraints in a given language (Kazanina et al., 2007; Kazanina & Phillips, 2010), here we examine whether the pronoun resolution in Chinese is also constrained by this language-specific grammatical constraint.

Experiment 1 (n=24 sets of items; 60 participants) was an offline questionnaire study and involved four conditions in (2). Coreference reading is possible in (2c), a forward anaphora & in (2b), a backward anaphora where overt pronoun occurs in the spec of NP, but not possible in (2a), a cyclic c-command condition. (2d) was added as a baseline which contained an additional NP as a legitimate antecedent. Native speakers of Chinese were asked to rate the acceptability of the conjoined reading of the underlined noun and pronoun on a scale from 1 (impossible) to 5 (absolutely natural). The results (Table 1) showed that the cyclic c-command condition received a significantly lower acceptability ratings than the other three conditions (p<.05), suggesting that coreference interpretation of sentences is guided by a syntactic constraint during offline processing.

Experiment 2 (n=24; 52 participants) employed a self-paced reading method to investigate whether the pronoun resolution is subject to the aforementioned grammatical constraint during the on-line processing. The main clause subject was manipulated to either match or mismatch the gender of cataphoric pronoun. We predicted that a gender mismatch effect would be found only for the no-constraint condition (3d) but not for the cyclic c-command condition (3b) at the critical main clause subject position, if pronoun resolution in Chinese is guided by syntactic constraints. The results showed no significant effect at the critical main clause subject (R9). However, there was a significant main effect of gender (t=2.289) and an interaction of two main effects (t=2.58) in the spill-over region (R10), with the gender mismatch effect found only in the no-constraint condition but not in the cyclic c-command condition. The gender mismatch effect in the no-constraint condition suggest that the Chinese speakers consider a coreferential reading only when the grammar allows it but not when the grammar forbids it, as in the cyclic c-command condition.

Overall, the results suggest that the active search of an antecedent of a pronoun is guided by a language specific constraints and that this constraint is operative both during the off- and on-line processing.

(1)尽管　　他 i 做 作业　　　　 的时候，李浩 *i/j　 在看　 电视，刘军 i　 　一点　 也　 不 生气。

　　　 Although he i　do homework when　　 Li Hao *i/j　 watch TV　　 Liu Jun i　 a little too not angry

"Although when he did his homework, Li Hao watched TV, Liu Jun was not angry at all."

(2a) Cyclic c-command:

Every Sunday when <u>she</u> ate breakfast, <u>Mary</u> worked on the crossword.

(2b) No-constraint:

Every Sunday when <u>her</u> classmate ate breakfast, <u>Mary</u> worked on the crossword.

(2c) Forward anaphora:

Every Sunday when <u>Mary</u> ate breakfast, <u>she</u> worked on the crossword.

(2d) Concession clause:

Although every Sunday when <u>she</u> ate breakfast, Mary worked on the crossword, <u>Kate</u> never offered to help.

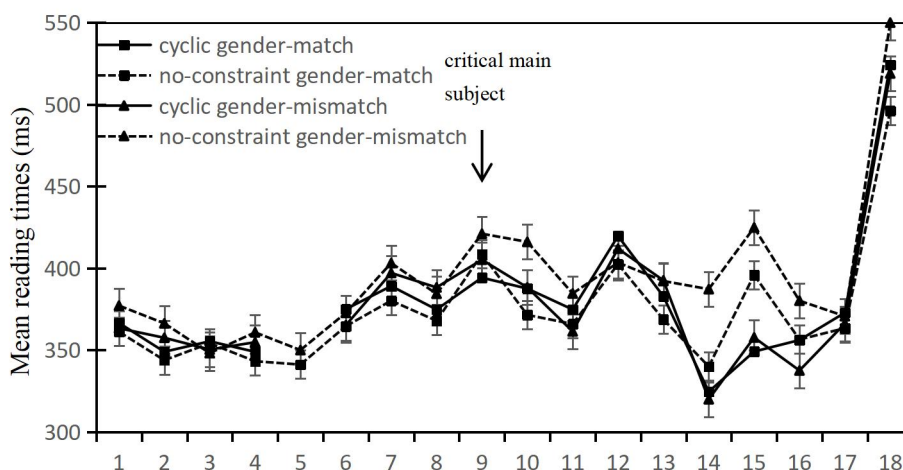**(3a, b) Cyclic c-command/match(mismatch)**

Although every Sunday when <u>she</u> ate breakfast, <u>Mary/Mike</u> worked on the crossword, Kate never offered to help.

(3c, d) No-constraint/match(mismatch)

Although every Sunday when <u>her</u> classmate ate breakfast, <u>Mary/Mike</u> worked on the crossword, John/Kate never offered to help.

Table 1 Mean rating results from Experiment 1

Condition	Mean rating (Standard error)
Cyclic c-command	2.23 (0.08)
No-constraint	3.68 (0.08)
Forward anaphora	3.07 (0.09)
Concession clause	3.73 (0.08)

虽然 1　　 每个 2 周日 3　 她 4[cyclic c-command] /她 4 同学 5 [no-constraint]吃 6 早饭 7　 的时候 8

Although every Sunday she　　　　　　　　 her classmate　　　　 ate breakfast when

田小美　　 （王智勇）9　　　 都会做 10 填字 11　　　 游戏 12，但 13 李婷婷　　 （刘文刚）14

Tian Xiaomei（Wang Zhiyong) work on crossword game　　 but   Li Tingting (Liu Wengang)

从来 15　没有 16 主动 17 帮忙 18。

always not　　 offer　 help

"Although every Sunday when (she/her classmate) ate breakfast, (Tian Xiaomei/Wang Zhiyong） worked on the crossword, (Li Tingting/Liu Wengang) never offered to help".

Figure 1. Mean reading times for the cyclic c-command and no-constraint conditions from Experiment 2.