

Adaptation Effects in Sentence Ambiguity Resolution Revisited

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Introduction. Adaptation effects in sentence comprehension argue that readers can quickly make adjustments to cope with the variabilities in linguistic environment [1]. Previous studies have examined the effect in the context of resolving main verb (**MV**) and relative clause (**RC**) ambiguity in English (e.g., *The experienced soldiers warned about the dangers [before the midnight raid vs. conducted the midnight raid]*). It was found in [1] that readers experienced enhanced difficulty with the preferred and frequent MV structures after being exposed to the dispreferred RC structures. However, subsequent studies did not always replicate the effect [2-4]. This study re-examines the adaptation effects in the resolution of the V+N1+de+N2 sequence in Chinese, which is structurally ambiguous between an **RC** reading and a **CC** reading [5-7], see Fig.1. It has been found that RC is preferred to CC before a disambiguation cue appears [5,8] and the parsing bias can be influenced by the plausibility of verb-argument combinations (V+N1 vs. V+N2). Moreover, a parallel parsing account suggested both parses are maintained in parallel [6]. We used this structure to re-examine the adaptation effects reported for MV/RC in English, aiming to investigate whether the effects can be observed in a structure with parallel parses.

Design. Eighty-two native Chinese speakers, matched on reading span scores, were assigned to either the Exposure (N=41) or the Control Group (N=41). They read three blocks of sentences (Table 1) in a self-paced moving window display (same as in [1]). All ambiguous constructions were strongly RC-biased (greater than 4.4) in the pretest, in which subjects were asked to rate the plausibility of V+N combinations on a 5-point scale (1: CC-biased; 5: RC-biased). As in Table 2, those constructions can be disambiguated as either RC or CC at the conjunction region. Our analyses focused on participants' RTs in the disambiguating conjunction regions (CONJ) and the spillover region (S1) across three blocks.

Results & Discussion. We performed linear mixed-effects models on the log transformed RTs on the two regions. Ambiguity effect was found in both CONJ and S1 regions in the first two blocks (Fig. 2A), indicating participants experienced difficulty in resolving ambiguity. Moreover, RTs in the critical region significantly reduced in both ambiguous and unambiguous conditions in Block 2 compared to Block 1 (CONJ: $\beta = -0.09$, $SE = 0.02$, $p < .001$) due to the priming effect. Critically, we did not find evidence of adaptation cost on the RC parses in Block 3; the Exposure Group who received an extra block of CC sentences did not have greater difficulty with the preferred RC structures (CONJ: $\beta = 0.01$, $SE = 0.03$, $p = .80$; S1: $\beta = 0.02$, $SE = 0.04$, $p = .60$). These results confirmed structural priming effect in the resolution of the Chinese RC/CC ambiguity; specifically, interpreting strongly RC-biased ambiguity as CC elicited large prediction errors thus produced priming effect [9]. More crucially, the parsing advantage for the preferred structure due to semantic plausibility still exists even after cumulative exposure to the dispreferred structures. And such an advantage was still observed with the high availability of alternative structure, namely CC, in sentence comprehension.

(1) relative clause (RC) reading

(2) complement clause (CC) reading

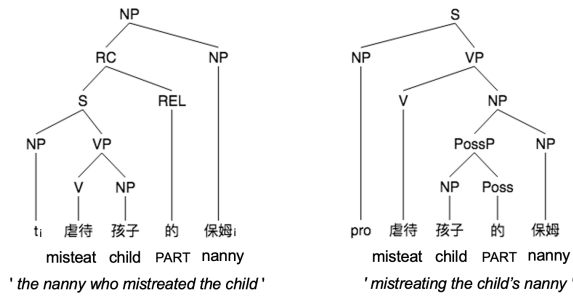


Figure 1. Syntactic structures of RC/CC in Mandarin.

Table 1. Block design.

	Exposure Group	Control Group
Block 1	16 CCs (8 ambiguous) + 16 fillers	32 fillers
Block 2	10 CCs (5 ambiguous) + 20 fillers	
Block 3	10 RCs (5 ambiguous) + 15 fillers	

Table 2. Sentence examples.

V	N1	de	N2	CONJ	S1	S2	S3	S4	S5	S6
1) Ambiguous CC (ACC)										
虐待	孩子	的	保姆	之后	那对	夫妻	最终	受到了	法律	制裁。
abuse	child	PART	nanny	after,	that	couple	finally	suffer	law	sanction
After abusing the child's nanny, that couple is finally legally sanctioned.										
2) Unambiguous CC (UCC)										
收到	客户	的	差评	之后	那位	卖家	立刻	检查了	产品	批次。
receive	customer	PART	negative comments	after,	that	seller	immediately	check	product	batch
After receiving the negative comments from customers, that sellers immediately checked the production batch.										
3) Ambiguous RC (ARC)										
指导	演员	的	导演	走后	那些	场记	也都	离开了	拍摄	现场。
guide	actor	PART	director	walk away,	those	log keeper	also all	leave	filming	set
After the director who guided the actor walked away, those log keepers also left the filming set.										
4) Unambiguous RC (URC)										
采购	食材	的	伙计	走后	那位	商家	及时	清点了	仓库	存货。
purchase	foodstuff	PART	fellow	walk away,	that	merchant	in time	check	warehouse	inventory
After the fellow who purchased the food walked away, that merchant checked the inventory in warehouse in time.										

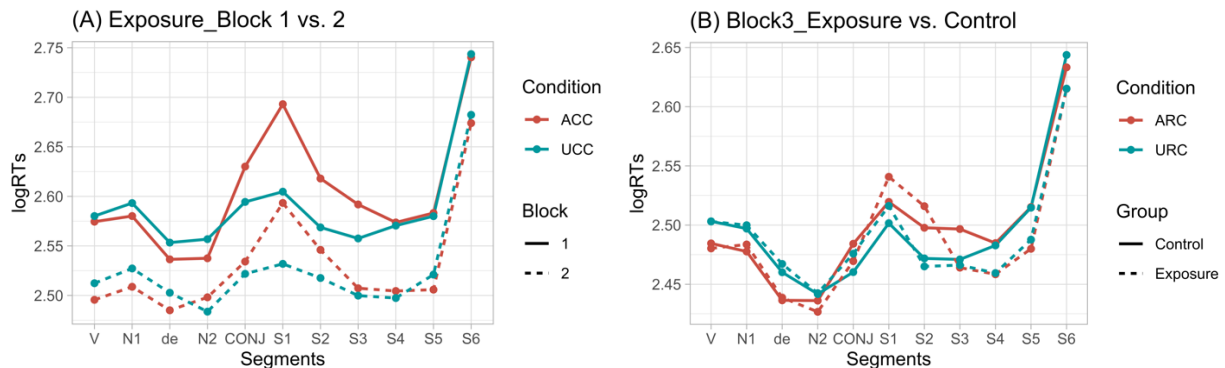


Figure 2. (A) Results from the comparison between Block 1 and Block 2 in the Exposure Group. (B) Results from the comparison between the Exposure and Control group in Block 3.

References. [1] Fine et al., 2013. *PLoS ONE*. [2] Stack et al., 2018. *Memory & Cognition*. [3] Dempsey et al., 2020. *Journal of Experimental Psychology*. [4] Xiang & Xu, 2021. *CUNY*. [5] Hsieh et al., 2009. *Language and Cognitive Processes*. [6] Hsieh & Boland, 2015. *Journal of Psycholinguistic Research*. [7] Lin, 2015. *CUNY*. [8] Zhang et al., 2000. *Acta Psychologica Sinica*. [9] Chang et al., 2006. *Psychological Review*.