When gaps precede fillers:

Processing temporarily ambiguous prenominal clauses in Mandarin Chinese

0. Avoiding gaps. The comprehension of filler-gap dependencies has long been a central topic in sentence processing research (e.g., Frazier & Clifton, 1989; Fodor, 1978). These are structures in which an element (the filler) is displaced with respect to the location at which it receives its thematic role (the gap). The great majority of research on this topic has focused on the processing of structures in which the filler appears before the corresponding gap site, suggesting that the active search for a gap is immediately initiated once a moved element is encountered, during incremental processing (this is known as the Active Filler Hypothesis). Fewer studies investigated the processing of sentences in which an element is extraposed to the right of its canonical position in English, so that a gap appears before the corresponding filler (Levy, Fedorenko, Breen, & Gibson, 2012; Staub, Clifton, & Frazier, 2006). Overall, results suggest that when a filler has already been unambiguously identified, a gap is posited in the first grammatically licit location. But when no filler has been identified, the parser avoids positing a gap. Other studies have investigated what happens when a filler gap dependency does not necessarily need to be posited due to temporary ambiguity. Staub et al. (2018) investigated the processing of syntactic ambiguity in strings such as “the information that the health department provided (a cure) reassured the tour operators”, where the that-clause can be either a relative clause involving movement of the head noun (the information) from the object position after “provided” (RC: “the information that the health department provided __”) or the clausal complement of the noun (CC: “the information that the health department provided a cure). They showed that CC constructions were read faster, providing evidence for a structural parsing strategy in which a gap is avoided if possible, consistent with the idea that readers follow a general avoid-gap strategy (Minimal Chain Principle, De Vincenzi 1991). Still, although the noun frequency bias (i.e., the tendency to be followed by an RC versus a CC) did not explain the pattern they found, it obviously played a role. **1. When gaps precede fillers.** The aim of this paper is to address the following question: what happens to the same temporary ambiguity (RC vs CC) in a language where the adnominal clause **precedes** the modified NP instead of following it? In this configuration, whatever the noun bias for an RC or a CC, this should not affect the incremental processing of the clause because the noun comes too late. Moreover, the possible gap comes before the possible filler but does not involve stylistically marked (and theoretically dubious) rightward extraposition structures. **2. Our study.** In order to answer this question, we designed a self-paced reading experiment in Mandarin Chinese with items inspired by Staub et al. (2018). Participants (N = 45 so far) read 60 sentences word by word, and we recorded their reading times at each word. Materials included 36 fillers (12 of which followed by a comprehension question) and 24 critical sentences that ended with an object noun modified by either an RC (e.g., sentence 1a) or a CC (e.g., sentence 1b). Each RC/CC pair was rotated in a Latin square design so that each participant read 12 RC sentences and 12 CC sentences. Crucially, each pair differed only in the fifth region (e.g., “out” vs. “identity” in the examples). The RCs and CCs always had a human subject, and the verb of the matrix clause did not select an animate object. This ensured that participants would expect a complex NP once they encountered the subject of the RC/CC. **3. Results.** We excluded data from two very slow readers (mean reading time > 800 ms) and two very rapid readers (mean reading time < 200 ms) and other extreme data points (reading times > 1000 ms or < 100 ms), resulting in the analysis of data from 41 participants. We found no hint of a difference in reading times between RC and CC sentences in any region. Crucially, as shown in Fig. 1, we found no difference in the region that differed between the two conditions (Region 0: e.g., “out” vs. “identity”), the region after it (Region +1: particle “de”, which was the definitive disambiguation point), or the region after (Region +2: the object noun, where a spillover could have occurred). **4. Discussion.** On the face of it, this result seems to suggest that Mandarin readers do not avoid gaps when both a

reading involving a gap (RC) and a gap-free reading (CC) are available, which is very surprising in the light of what we know from previous literature. An alternative interpretation of our result is that the avoid-gap strategy was in fact active in Mandarin readers, though its effect on reading times was obscured by a frequency bias in favor of RC readings. Indeed, for the types of constructions tested in our experiment, RCs are in general by far more frequently used in Mandarin than CCs. Future experiments should try to disentangle the avoid-gap strategy and the overall frequency bias to better understand syntactic parsing that involves temporary structural ambiguity.

References

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(1) Example sentences from the experiment, with '_' indicating a gap. Key regions highlighted in bold.

a. 我 读到了 小明 捏造 出来 的 消息。 RC
I read Xiaoming fabricated **out** _ **de** **news**.
'I read the news that Xiaoming fabricated.'

b. 我 读到了 小明 捏造 身份 的 消息。 CC
I read Xiaoming fabricated **identity** **de** **news**.
'I read the news that Xiaoming fabricated his identity.'

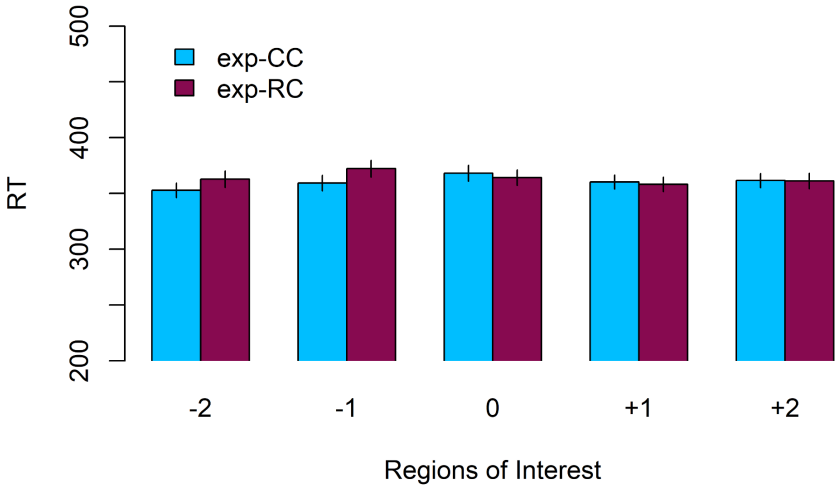

Fig. 1 Reading times in the CC vs. RC condition. Region 0 is the word that differs between the two conditions (e.g., "identity" vs. "out"). -N words appeared before it, and +N words appeared after it.