

Grammatical factors' influences on relative clause attachment in Mandarin: Evidence from an interpretative judgment task (Chong Zhang, Stony Brook University)

A long running practice in psycholinguistic research has been to examine how human sentence processing mechanisms handle *ambiguity* and relative *complexity* of syntactic structures, as well as whether there are *universal* principles governing sentence processing that hold cross-linguistically. Work examining the processing of relative clause structures has been important to shed some light on parsing mechanisms. What are relevant to the present study are two investigation areas, one focusing on *difficulty* of processing procedure distinctions (e.g., object (1a) versus subject (1b) relatives), and another addressing resolution of attachment *ambiguity* (i.e., local (2a) versus non-local (2b) modification by the relative clause).

- (1) a. The **entrepreneur** [that *e* invited the tycoon] died. (SRC)
 b. The **entrepreneur** [that the tycoon invited *e*] died. (ORC)
- (2) Someone shot the servant of the actress [who *e* was standing on the balcony]
 a. [the servant [of [**the actress** [who *e* was standing on the balcony]]]] (LOCAL)
 b. [[the servant [of the actress]] [who *e* was standing on the balcony]] (NON-LOCAL)

Much psycholinguistic research has investigated the processing of SRCs (1a) versus ORCs (1b). The SRC processing advantages have been found unanimously in post nominal languages such as Brazilian Portuguese (Gouvea, 2003), Dutch (Frazier, 1987), English (Gibson et. al 2005), French (Frauenfelder et. al 1980) and German (Schriefers et. al 1995). In prenominal languages, findings are varied. Both Japanese and Korean appear to demonstrate SRC preferences (Kwon et. al 2004; Miyamoto et. al 2003), but Mandarin displayed contradictory results although the same methodology was used, namely the self-paced reading task. Lin and Bever (2006) have reported that Mandarin RC has an SRC advantage but Hsiao and Gibson (2003), as well as Baoguo Chen et. al (2007) have reported an ORC advantage.

Trying to unify processing preference of Mandarin RCs, there is a concern that to my knowledge has not been addressed in the literature, yet might be relevant, namely the fact that Mandarin-*de*, in addition to serving as a relativizer, also serves as the possession marker. This concern can be studied in the present study by considering a complex example involving an SRC, as in (3), where the sequence **V NP₀ DE₁ NP₁ DE₂ NP₂** can be parsed in at least three different ways (3a-c).

- (3) *Zhiliao yinger de yisheng de zhensuo guanmen le.* (SRC)
 cure baby DE1 doctor DE2 clinic close Perf
- V NP₀ DE1 NP₁ DE2 NP₂ V**
- a. [[[*e* cure baby] DE1_{rel}] **doctor**] [DE2_{poss} clinic] (LOCAL)
 “[The doctor that cured the baby]’s clinic...”
- b. [[*e* cure baby] DE1_{rel}][doctor [DE2_{poss} **clinic**]] (NON-LOCAL)
 “The doctor’s clinic that cured the baby...”
- c. [*e* cured [baby [DE1_{poss} doctor]]] DE2_{rel} **clinic**
 “The clinic that cured the baby’s doctor...”

In both (3a) and (3b) DE₁ is parsed as a relativizer, but these cases differ in whether the relative clause modifies “doctor” (3a) or “clinic” (3b) in the subsequent possessive structure (where DE₂ is the possessive marker). In (3c), in contrast, DE₁ is parsed as the possessive marker; that is, the sequence “cured baby DE doctor” is locally ambiguous. Importantly no parallel to (3c) exists with ORCs, where only the attachment ambiguity (4a/b) manifests given the word order within the relative clause:

(4) *Bingren tousu de yisheng de zhensuo guanmen le.* (ORC)
 patient sue DE1 doctor DE2 clinic close Perf
 NP₀ V DE1 NP₁ DE2 NP₂ V

a. [[[patient [sue e]] DE1_{rel}] **doctor**] [DE2_{poss} clinic]
 “[The doctor that the patient sued]’s clinic...”

b. [[patient [sue e]] DE1_{rel}] [doctor [DE2_{poss} **clinic**]]
 “The doctor’s clinic that the patient sued...”

This observation of the presence of an additional ambiguity in (3) which is absent in (4) leads to the question whether the local possessive/relative ambiguity in Mandarin SRCs contribute to their processing difficulty (compared to Mandarin ORCs). Further questions we address concern the resolution of the attachment ambiguities (i.e., (3a)/(4a) versus (3b)/(4b)) in these structures. Much previous work has suggested that there exist cross-linguistic differences in how these ambiguities are resolved, with some languages preferring the local modification (e.g., preference for (2a) over (2b) for English; see Gibson et. al 2005), while other languages may prefer the non-local attachment (i.e., (2b) over (2a) in languages like Brazilian Portuguese, Dutch, French German.).

In this paper we used a self-paced reading task tested on 36 Mandarin native speakers, consisting of sentences in which syntactic and semantic/pragmatic cues are manipulated to explore how the human parsing mechanisms handle the processing of cases like (3)/(4) above. A 2(Animate/Inanimate head noun) by 2(w/o demonstrative before head noun) by 2(Active SRC/Passive SRC (sharing the same structure as ORC but with a passive marker at the beginning of sentences)) by 2(RC attachment plausibility: biased/equal) within-subject design is adopted. Results we report in this paper are from a semantic judgment task following the self-paced reading task. A question is asked after each stimulus, and participants choose one answer out of three, being local, non-local and either attachment. Reading time over every lexical item in all 16 conditions is also collected, but left for further analysis. Statistical analysis is performed by the linear mixed-effects model with lme4 package for statistical language R (R Core Development Team, 2008). We have drawn the following conclusions from the data collected:

- There is an animate NP attachment preference.
- There is a local NP attachment preference.
- Animacy has a bigger effect than Locality on attachment preference.
- Mandarin SRCs may take longer to process partly due to an ambiguity not present in ORC/PSRCs.
- The combined cue of being modified by a demonstrative and passive RC pushes integration of an NP as head of RC.

Selected References:

Frazier, L. (1987). Sentence processing: A tutorial review.
 Gibson, E., & Wu, H. H. I. (2013). Processing Chinese relative clauses in context. *Language and Cognitive Processes*, 28(1-2), 125-155.
 Grillo, N., & Costa, J. (in press). A novel argument for the universality of parsing principles.
 Hsiao, F., & Gibson, E. (2003). Processing relative clauses in Chinese. *Cognition*, 90(1), 3-27.
 Lin, C. J. C., & Bever, T. G. (2006). Subject preference in the processing of relative clauses in Chinese. In *Proceedings of the 25th west coast conference on formal linguistics* (pp. 254-260). Somerville, MA: Cascadilla Proceedings Project.