

Classifier as a cue for structure building in head-final relative clause
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Previous studies have suggested a predictive mechanism for relative clause processing in languages that have a head-final relative clause structure, like Japanese (Yoshida et al., 2004) and Mandarin Chinese (Hsu, 2006; Wu, 2009). However, it still remains unknown what type of information the parser utilizes to anticipate the structure of an upcoming relative clause and how detailed such structure building is before receiving information from the head noun directly. To address this, we investigated how the semantic information provided by different classifiers in Mandarin Chinese (human, non-human, general) guides the structure building of an upcoming relative clause, using a dislocated classifier and following verb as a cue to indicate the presence of a relative clause and manipulating the type of classifiers to examine whether the parser uses classifier type to predict the gap site in a relative clause.

A norming and eye-tracking study were conducted to explore the effect of dislocated classifiers on head-final relative clause processing. Classifier+transitive verb sequences are temporarily ambiguous between a subject RC and a null subject object RC construction as shown in (1a) and (1b). Although the parser is bias to adopt a subject RC analysis over a null subject analysis (Lin & Bever, 2006), the parser may use the semantic cues of the classifier to guide which of these two RC structures is initially adopted. In particular, a non-human classifier may guide the parser away from a subject RC analysis by determining that the head noun will not be an eligible subject for a subject RC. We predicted that this should facilitate the analysis of a null subject relative clause. With human and general classifiers, the parser is more likely to assume a gap in the subject position and expect a noun to fill the object position, and thus experience reading disruption upon encountering an unexpected relativizer and head noun. The general classifier is used as a baseline in both norming and eye-tracking because a general classifier does not contain specific information about the semantic property of the head noun, thus both subject/object gap are plausible.

Norming: An online sentence completion survey (N=439) was conducted as a norming task. The results suggest that a majority of native Mandarin speakers (69.3%) produce a relative clause construction for classifier + verb constructions (8.8% responses are other grammatical constructions and were removed from the stimuli list for eye-tracking experiment). In human classifier condition, an overwhelming preference is shown for subject-gapped RC structure (92.2%). In general classifier condition, subject-gapped RC (71.4%) is also preferred over object-gapped RC (28.9%). However, in non-human classifier condition, participants are willing to produce object-gapped relative clauses (85.9%), suggesting that the relative clause types are influenced by the classifier types.

Eye-tracking: Verbs and head nouns are selected based on the responses in the norming study and are used as stimuli in an eye-tracking while reading experiment (N=42). Results of linear mixed effect model show reading facilitation with a non-human classifier compared with a baseline general classifier at the relativizer region in first fixation (Est=-12.24 ms, $t=-2.399$, $p<0.05$), first pass (Est=-14.17 ms, $t=-2.545$, $p<0.05$), go pass (Est=-39.38 ms, $t=-2.077$, $p<0.05$) and total fixation (Est=-48.62 ms, $t=-4.139$, $p<0.001$). Human classifiers show greater reading disruption compared with general classifier in go pass reading (Est=66.30 ms, $t=3.499$, $p<0.01$) and total fixation time (Est=46.59 ms, $t=3.969$, $p<0.001$). These effects are largely recapitulated at the head noun region. For non-human classifier condition, facilitation is significant in go pass reading (Est=-58.27 ms, $t=-2.842$, $p<0.01$) and total fixation (Est=-81.35 ms, $t=-3.314$, $p<0.01$). For human classifier, disruption is significant in first pass reading (Est=14.33 ms, $t=2.326$, $p<0.05$), go pass reading (Est=86.64 ms, $t=4.310$, $p<0.001$) and total fixation (Est=58.67, $t=2.39$, $p<0.05$).

Overall, the results of this study indicate that the parser uses the semantic properties of classifiers to guide structure building for head-final relative clauses before accessing the head noun. Non-human classifiers guide the parser away from preferred subject-gapped relative clause, facilitating their analysis, while human classifier can reinforce the prediction of a subject-gapped relative clause, leading to reading time disruption.

- (1) a. 那个扔掉 垃圾 的 小孩 得到 了 表扬。 (subj RC)
 That CL throw rubbish REL child receive PERF praise
 That child who threw rubbish received praise.
- b. 那个扔掉 的 娃娃 变得 脏兮兮 的 了。 (obj RC + null subj)
 that CL throw REL doll become dirty PERF
 that doll which (someone) threw away became dirty.

Norming: Example stimuli for sentence completion task:

那 { 名 / 个 / 张 } 扔掉 _____
 That { Human.CL / General.CL / Nonhuman.CL } throw _____

Eyetracking: Example stimuli for eye-tracking reading comprehension task:

a. Human classifier condition:

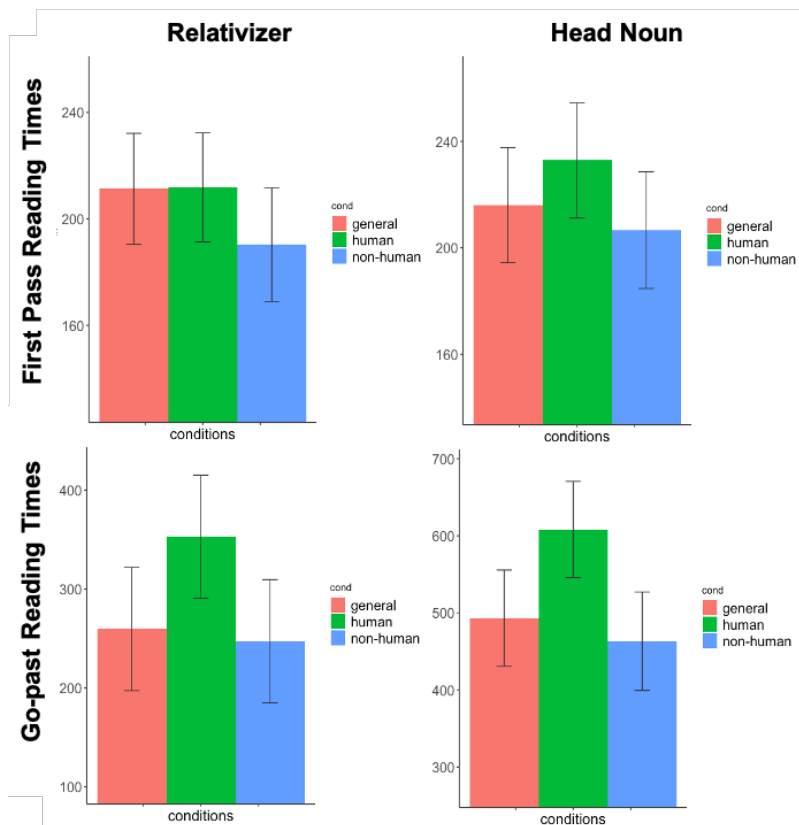
那 名 捡到 的 孩子 已经 醒过来 了。
 That CL find REL child already awake PERF
 The child that (someone) found is already awake.

b. General classifier condition:

那 个 捡到 的 硬币 已经 脏兮兮 的 了。
 That CL find REL coin already dirty PERF
 The coin that (someone) found is dirty.

c. Non-human classifier condition:

那 张 捡到 的 银行 卡 已经 还给 失主 了
 That CL find REL credit card already return owner PERF
 The credit card that (someone) found has already been returned to its owner.



Selected References: Hsu, C-C N. (2006). Ph.D. thesis. University of Delaware; 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 (Vol. 25, pp. 254-260). Somerville, MA: Cascadilla Proceedings Project. Wu, F., Kaiser, E., & Andersen, E. (2009). In the Proceedings of the Western Conference on Linguistics (WECOL); Yoshida, Masaya, Sachiko Aoshima, and Colin Phillips (2004), In the 17th Annual CUNY conference on Human Sentence Processing, University of Maryland.