Two cases of incremental parsing in Korean: conditionals and relative clauses

The strong head-finality of Korean raises many potential challenges to *incremental parsing*. In languages like Korean, there is normally no indication of clause structure before the parser encounters the verb or the relative head at the end of the clause. This *uncertainty* of clause structure can potentially give rise to the processing difficulty of verbs in head-final languages. Developing our earlier studies in Japanese, we present four series of experiments (offline and online) to show that there are, however, cases where the processing of clause-final verbs can be indeed *predicted* and *facilitated*. One is when the presence of a conditional-clause structure and a conditional-verb morphology is signaled by the conditional adverb which is licensed only by a conditional-marked verb, as in **I**. The other is when the upcoming head of a relative clause (RC) is signaled by a numeral classifier. Once the presence of the relative clause is signaled, its verbal morphology can be predicted because verb in RCs must bear adnominal form (noun-modifying inflection), as in **II**.

Korean conditional *if*-clauses normally cannot be detected until the clause-final conditional verb is reached, but the optional conditional adverbial *manyak* may provide a cue for the upcoming verb form. **Experiment 1** (sentence completion, n=40) showed that the presence of *manyak* modulated expectations for conditional verbal morphology. As summarized in the column chart below, fragments containing *manyak* yielded *if*-clause completions on 97.1% of trials, whereas *if*-clause completions were extremely rare (0.5%) when *manyak* was replaced with a non-conditional adverb.

Experiment 2 (self-paced reading, n=40) showed that information from *manyak* considerably facilitated the processing of conditional verbs online. Reading times at 'V-cond' were faster in the *manyak* condition than in the adverb condition (ps<.05). These results indicate that the conditional adverb provides a reliable cue to the upcoming verb form.
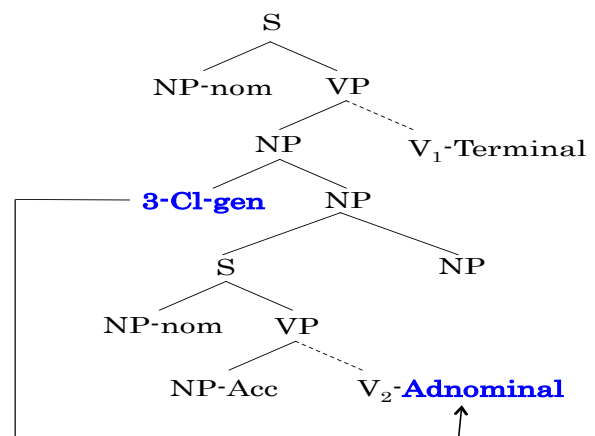
Likewise, Korean RCs tend not to be detected early due to the head-finality. However, a numeral-classifier can signal the upcoming relative head. The semantic incompatibility between the classifier (e.g., book) and the immediately following subject NP (e.g., student), forces the classifier to be associated with the relative head noun (e.g., book). **Experiment 3** (sentence fragment completion, n=40) showed that locally matching vs. mismatching numeral classifiers strongly biased the type completion. In classifier-mismatch conditions 81.4% of completions involved RCs, contrary to classifier-match conditions (0.7%).

Experiment 4 (self-paced reading, n=40) showed that information from mismatching numeral classifiers led to the facilitation for the embedded verb processing. Reading times at the embedded adnominal verb showed a significant facilitation in the classifier-mismatch condition, in sharp contrast to the classifier-match condition (human-student) (ps<.05).

These findings suggest that the parser utilizes the information in the left context to anticipate the form of the upcoming verb, not only when there is a direct dependency between the verb and the adverb but also when the verb has an indirect relation with the classifier. Thus, this study supports previous arguments in the literature that the parser does not wait until the clause final verb to build the sentence structure even in head-final languages. *(500 words)*
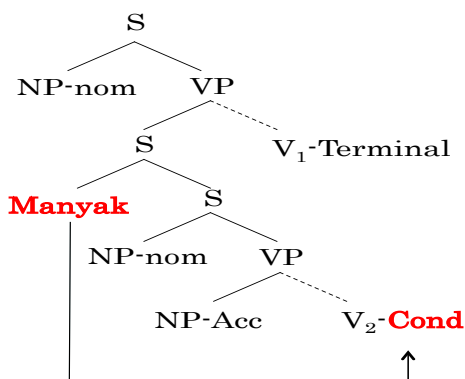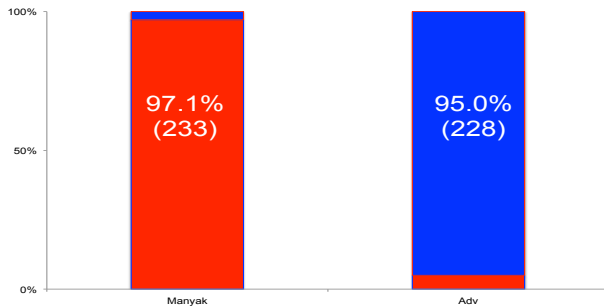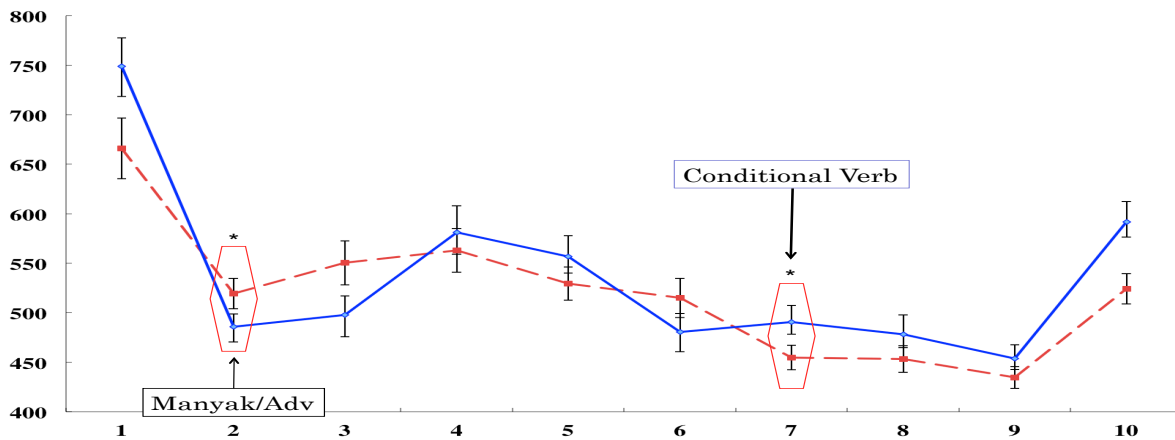
I. Conditional clauses (experiment 1-2) **II. Classifier & Relative clauses** (experiment 3-4)

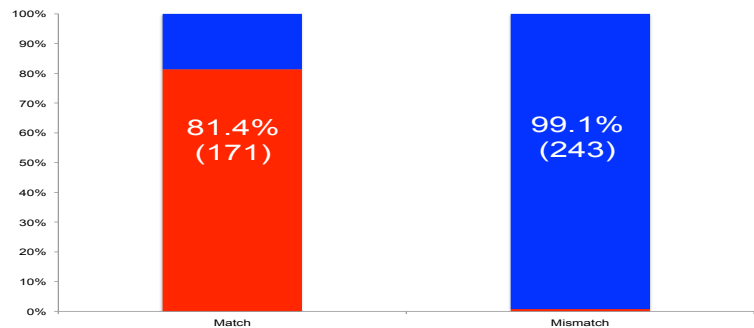**Experiment 1.** Sentence completion task for *Manyak* ('by any chance') vs.

Experiment 2. Self-paced reading task for *Manyak* ('by an

Experiment 3. Sentence completion task for Classifier Match vs. Mismatch condition

-Classifiers are reliable cues for RCs.

-If there is no explicit cue, RCs are not preferred.

Match vs. Mismatch condition