Subject-Object Asymmetries in Korean Sentence Comprehension

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Research Question

Why are SRCs easier than ORCs in Korean?

 Subject-extracted relative clasues (SRCs) are easier to process than object-extracted relative clauses (ORCs) in many languages (e.g. French: Holmes & O'Regan 1981; Dutch: Frazier 1987; English: King & Just 1991; German: Mecklinger et al. 1995).

- The same asymmetry is observed in Korean (in terms of comprehension rate/ reaction time/reading time: Lee, 2007 and Kwon, 2008).



Why Is Korean Interesting?

Local structural ambiguity is relatively high in Korean.

The clause type is ambiguous until the listener reaches the end of the clause due to these properties. - SOV word order: the verb comes in the end of the clause. - pre-nominal RCs: a relative clause comes before the head noun.

- pro-drop: the gap in a relative clause is potentially confused with an empty pronoun.
 - no relative pronoun: the adnominal verb ending makes an insufficient signal of relative clauses.



Entropy Reduction

Processing difficulty correlates with the uncertainty about the future grammatical derivations.

 Since sentence processing crucially involves the determination of its grammatical structure, processing difficulty should be related to uncertainty (i.e. *entropy* in information theory) about the future grammatical derivations for a given string.

Therefore, we have constructed a small probabilistic grammar of Korean to cover the four different types
of clauses that are potentially indistinguishable from relative clauses, with an empty subject or object
(thus 4 X 2 = 8 sentence types).

- The processing difficulty at a certain word is formalized as any downward change of entropy value at that word (Hale, 2006).



Correct Predictions for Relative Clauses



on Our information theoretical model predicts the SRC advantage.

- The asymmetry at the head noun position drives the overall difference. This is because the ORC prefix before the head noun has more possible alternative continuations than the corresponding SRC prefix.

SRC prefix [e 기자를 협박한] Sbj Obj Verb

ORC prefix [기자가 e 협박한] Sbj Obj Verb 기자가 [e e 협박한] Sbj Obj Verb

Word-by-word reading time observation (Kwon 2008) SRC ORC ORC ORC This prediction matches existing experimental evidence. - The word-by-word reading time measurement in Kwon (2008) shows the overall SRC advantage. - A significant subject-object asymmetry at the head noun position is observed in this experiment.

500 W1 W2 W3 W4 W5 W6 Verb Noun W9 W10 Verb

ms

2000

1500

1000

Further Predictions for Other Types of Clauses

Our model further predicts the same asymmetry for noun complement clauses.

- A subject advantage is predicted for noun complement clauses with a *pro* for the same reason as relative clauses since the two types share the same form of the prefix.



It also predicts great processing load when clause-type disambiguation occurs.

- The clause type is determined at the states with double-circles, which correlate with the positions where great comprehension difficulty is predicted.



Conclusion

The Entropy Reduction Approach provides an adequate account for processing difficulty.

- It clearly defines the source of processing difficulty.

 - Compared to other approaches to the processing difficulty patterns of relative clauses (e.g. the Linear Distance theory: Wanner & Maratsos, 1978; Gibson, 2000; the Structural Distance theory: O'Grady, 1997; Hawkins, 2004) only our approach explains exactly where greater difficulty starts to accrue during incremental sentence processing.

- The same model correctly accounts for the observed SRC advantage in languages with different syntactic features, such as English (Hale, 2006; Stefan, 2010; Wu, 2010) and Korean (this poster).

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