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The Time Course of Syntactic, Semantic, and Pragmatic Effects on Memory Accessibility in Sentence Comprehension

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Gernsbacher (1990) found that the relative mention order is critical factor to determine the relative strength of the representation whereas the semantic role of a constituent did not have any effect on sentence representation. However, in their study, the pragmatic factor was confounded with the syntactic role. Six experiments were conducted to investigate the effects of each constraint (syntactic, semantic, and pragmatic) on the sentence representation and to determine the time course of activation level of constituent.

Method

The experimental method was exactly identical through all six experiments except RSVP rate and delay.

Participants. 64 undergraduate students per experiment participated in each experiment.

Design. 2 (subject, object) x 2 (agent, patient) x 2 (first, second) repeated measures design was used.

Materials. A set of 32 experimental sentences was constructed with eight versions each. The eight versions reflected the combination of the syntactic (subject vs. object), semantic (agent vs. patient), and pragmatic (first vs. second) manipulation. The syntactic factor was manipulated by putting the target character's name on either grammatical subject or object position. The semantic factor was manipulated by using either active or passive voice. The pragmatic factor was manipulated by the order of mention. Since the object of a sentence can be placed before the subject in Korean, it is possible to dissociate the syntactic role from the order of mention through the use of inversion (Kim & Lee, 1995).

Procedure. Participants read sentences that were presented one word at a time on the center of a computer monitor. After the last word of each sentence disappeared, a test probe (name) appeared. The subject's task was to verify as rapidly and accurately as possible whether the test name had occurred in the sentence they just finished reading. To keep subjects from attending to only participants' name, we followed each experimental sentence with one of four different kinds of comprehension questions. Across six experiments, we varied RSVP rate and interval between the offset of the last word and onset of the test probe.

Results and Discussion

The results indicated that pragmatic constraints have very strong effects on the initial representation from the early stage to later stage (up to 1000ms). That is, the constituents mentioned earlier in the sentence are strongly represented and their memory accessibility is increased. On the contrary to the pragmatic constraint, the effect of syntactic and semantic constraints was not found except the syntactic effect in Experiment 2 (RSVP rate of 250ms with 500ms delay). The results suggest that syntactic constraints affect the sentential representation immediately (before 500ms delay) and their effects disappear shortly after.

There are two theoretical models on sentence processing, two-stage model and multiple constraints satisfaction approach. According to two-stage model, the initial representation of a sentence is constructed through the syntactic analysis and then it is evaluated or modified by semantic or pragmatic constraints (e.g., Frazier, 1989). On the other hand, the multiple constraints satisfaction approach states that several constraints interact each other immediately in constructing the representation of a sentence (e.g., McClelland, St. John, & Taraban, 1989). However, the findings of this study support neither model because it was found that pragmatic constraints play the most important role from the early stage of constructing the representation of a sentence while semantic and syntactic constraints do not.

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