Grammatical function assignment and word order determination in grammatical encoding level: Evidence from structural priming effects in Japanese sentence production

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Using a structural priming paradigm, the details of sentence production model have been investigated substantially, specifically the processes in grammatical encoding level (e.g., [1]). Many studies provide evidence that the function assignment stage and the constituent assembly stage are processes separately in grammatical encoding (e.g., [2]). However, it is less known whether these two stages are interacted with each other during the production processes, and if so, how the processes are executed.

In this study, we report a structural priming experiment in Japanese, a relative free word order language. Function assignment and word order were manipulated independently and simultaneously in order to examine the processes at two stages directly. Our results revealed that priming effects patterns were different depending on whether the effects occur at function assignment stage or at constituent assembly stage.

In a confederate-participant dialogue-style task, native Japanese speakers (n=33) were instructed to describe pictures in turn with a confederate and repeated each other’s descriptions. Participants were encouraged to create and memorize a mental image of the picture that their confederate described, and they performed a recognition task after each block.

To ensure that the observed effects are purely structural in nature, conceptual factors such as event type, animacy of NPs, and viewpoint shifts were carefully controlled in the prime/target pairs. That is, our experimental items only involved human entities for both agent and patient, minimizing the bias of conceptual accessibility. The event type between primes and targets was paired among positive, negative or neutral types, in order to eliminate the possibility that the event similarity facilitates the use of same viewpoint between the prime/target pairs. The prime was either an active or a passive voice sentence with canonical (SOV) or scramble (OSV) word order: (1) SOV-active prime, (2) OSV-active prime, (3) SOV-passive prime, and (4) OSV-passive prime. A target picture such as (5) was presented immediately after the prime.

Voice and word order priming effects were observed even after conceptual factors being strictly controlled. The results showed that in SOV-passive responses, voice was interacted with word order (p<.05) (Figure 1). More SOV-passive sentences were produced after SOV-passive primes (6%) than after SOV-active primes (1.6%). Although both function assignment and word order were different between the prime/target pairs, the difference was also found in active prime conditions – more SOV-passive sentences were produced after OSV-active (4%) than after SOV-active (1.6%). The results show the similarity between the OSV-actives and SVO-passives that is consistent with previous studies (e.g., [3]), and suggest the priming effects might occur outside the grammatical encoding level. In contrast, in OSV-active responses only the main effect of word order was significant (p<.05) – more OSV-actives were produced after OSV primes than after SOV primes (Figure 2). This result suggests that word order determination occurs indecently from function assignment stage, after an active voice is selected at function assignment stage.
Taken together, our findings suggest that various factors affect and complicate the processes at function assignment stage; however, the processes at constituent assembly stage are rather straightforward by the syntactic options available in that language.

Examples
(1) SOV-active prime: sapootaa-ga sakkaa sensyu-o ooensi-teiru.
fans-NOM soccer player-ACC cheer
The fans are cheering the soccer player.

(2) OSV-active prime: sakkaa sensyu-o sapootaa-ga ooensi-teiru.
soccer player-ACC fans-NOM cheer
The fans are cheering the soccer player.

(3) SOV-passive prime: sakkaa sensyu-ga sapootaa-ni ooen-sare-teiru.
soccer player-NOM fans-OBL cheer-PASSIVE
The soccer player is being cheered by the fans.

(4) OSV-passive prime: sapootaa-ni sakkaa sensyu-ga ooen-sare-teiru.
fans-OBL soccer player-NOM cheer-PASSIVE
The soccer player is being cheered by the fans.

(5) target picture

References: