Real-Time Computation of Social Hierarchy During Online Sentence Processing

Nayoung Kwon[1], Joonwoo Kim[2], Kichun Nam[2], Jeongseok Kim[2]
University of Oregon[1]; Korea University[2]

Social hierarchy is crucial information that language users must consider while using language. In this study, we examined how such information is processed during language processing (cf. Jiang et al., 2013; Tokimoto et al., 2021), using the benefactive construction in Korean. The benefactive construction in Korean is highly rule-based, providing an ideal testing ground for examining the processing of social hierarchy. It consists of an action verb and a benefactive auxiliary verb, signaling a benefactive event where the agent performs an action in favor of the recipient (Sohn, 1999). Importantly, the choice of the auxiliary verb depends on the relative social status between the agent and the recipient (1). When the agent holds a lower social status than the recipient, the honorific auxiliary verb, *-tulita* 'to give', is used. Conversely, when the agent's social status is equal to or lower than that of the recipient, the plain form *-cwuta* 'to give' is used. Accordingly, proper interpretation of the construction requires a rapid evaluation of relative social hierarchy linguistically encoded in a sentence against real-world knowledge.

In Exp 1, we conducted a questionnaire study (21 participants; 40 sets of sentences). We manipulated the social standing of the recipient (higher vs. lower) in relation to that of the agent in a sentence, as well as the use of the honorific or plain form of an auxiliary verb (*-tulita* vs. *-cwuta*). Participants were asked to evaluate the naturalness of the sentences on a Likert scale (0: very strange; 5: very natural). The results showed significant effects of recipient type, auxiliary verb type, and their interaction. The feature matching conditions (2a & 2d) yielded the highest rating results. The use of a mismatching auxiliary verb resulted in lower naturalness ratings (2b & 2c). However, the mismatch effect was much stronger in the NHr.Hv condition (2b) where an honorific form was used for a recipient with a lower social standing. These results suggest that native speakers of Korean actively evaluate the relative social standing inferred from sentences against their world knowledge when interpreting sentences.

In Exp 2, we conducted an eye-tracking experiment (40 participants), using the same sets of the sentences used in Exp 1. The results showed a significant interaction between recipient type and auxiliary verb type in the first pass, regression path and total duration at the critical verb position, R5 (all ps < 0.03). These results were due to significantly longer reading times in the NHr.Hv condition (2b) compared to other conditions, consistent with the findings of Exp 1. Interestingly, the other feature mismatching condition (Hr.NHv: 2c) did not incur processing difficulty at any reading time measure when compared to its corresponding feature matching conditions (Hr.Hv 2a or NHr.NHv 2d), unlike in Exp 1. These results suggest that native speakers of Korean not only construct semantics but also actively engage in computing the relative social hierarchy of referents within a sentence based on their world knowledge during online sentence processing. However, the results also imply that their attention to hierarchy appears nuanced and selective during online processing. The use of an honorific auxiliary verb for a recipient with lower social standing disrupted sentential processing during an early stage, as indicated by first pass duration. Surprisingly, the absence of an honorific expression for a recipient with higher social standing did not incur a corresponding processing difficulty.

In summary, Exp 1 and 2 showed that, at least in languages where social hierarchy is ingrained in grammar, the computation of relative social hierarchy occurs in real time during early sentence processing. The results suggest the possibility that, in Korean, the benefactive construction may illustrate a case of object-verb honorific agreement, where the honorific feature of the recipient (in the object position) and auxiliary verb should match. However, the eye-tracking data suggest a nuanced pattern: the honorific auxiliary verb *-tulita* requires an honorifiable recipient, but not vice versa, suggesting that the benefactive construction in Korean showcases an asymmetrical object-verb agreement during the online processing.

(1) 나는 　　사장님/딸에게 　　　　서류를 　　　　보내 　　드리/주-었다

    Na-nun　sacangnim/ttal-eykey　selyu-lul　　　　pony　tuli-/cwu-ess-ta

    I-TOP　　CEO/daughter-DAT　　document-ACC　sent　HON.AUX/AUX-PST-DECL

    'I sent a document to the president/daughter.'

(2) Target sentences in Experiment 1 & 2

a. H.recipient & H.verb (Hr.Hv) (HON feature matching condition)

영수는	사장님께	정리한	서류를	보내 드리고 R5	…
Yeongswu-nun	sacangnim-kkey	cengliha-n	selyu-lul	ponay-tuli-ko	
Y-TOP	CEO-HON.DAT	prepare-ADN	document-ACC	send-HON.AUX-and	

b. NH.recipient & H.verb (NHr.Hv) (HON feature mismatching condition)

?영수는	딸에게	정리한	서류를	보내 드리고 R5 …	
Yeongswu-nun	ttal-eykey	cengliha-n	selyu-lul	ponay-tuli-ko	
Y-TOP	daughter-DAT	prepare-ADN	document-ACC	send-HON.AUX-and	

c. H.recipient & NH.verb (Hr.NHv) (HON feature mismatching condition)

?영수는	사장님께	정리한	서류를	보내 주고 R5 …	
Yeongswu-nun	sacangnim-kkey	cengliha-n	selyu-lul	ponay-cwu-ko	
Y-TOP	CEO- HON.DAT	prepare-ADN	document-ACC	send-AUX-and	

d. NH.recipient & NH.verb (NHr.NHv) (HON feature matching condition)

영수는	딸에게	정리한	서류를	보내 주고 R5 …	
Yeongswu-nun	ttal-eykey	cengliha-n	selyu-lul	ponay-cwu-ko	
Y-TOP	daughter-DAT	prepare-ADN	document-ACC	send-AUX-and	

…바로 　　　　퇴근했다.

…palo　　　　thoykunhay-ss-ta

…immediately　left.work

'Y sent the prepared document to the CEO/daughter and immediately left work for the day.'

(3)

Rating results of Experiment 1	Eye-tracking results of Experiment 2 (log-transformed residual reading times at R5 (2))