

Korean Verb Prediction in sentence comprehension

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Research on prediction has sought to investigate whether it is based on semantic/heuristic cues, syntactic cues, or both. Investigation of verb prediction is particularly important since it is well known that verbs play a critical role in sentence processing. In that sense, verb-final languages like Korean or Japanese make a good testbed for investigating verb prediction. Many previous studies^{1,2,3} have shown that syntactic cues are simply overridden by heuristics-based semantic cues/processors. However, Momma et al. (2016) found that changing a case marker on a noun from accusative to genitive or vice versa modulates the N400. This indicates that a morphosyntactic cue (a case-marker) can affect the predictability of a verb when it changes the expected syntactic category of the upcoming word (after an accusative case marker, a verb should follow, while after a genitive case marker, a noun is predicted). This study seeks to expand the scope of previous findings by testing Korean, another verb-final language, to investigate if changing case markers from N+Acc (grammatical) to N+Gen (ungrammatical) embedded in Korean sentences can affect the predictability of the upcoming verb or whether the expectation is overridden by semantic/heuristic cues.

Method: Native speakers of Korean (N=40) at a Midwestern university read 100 sentences including 32 sets of critical sentences during eye-tracking and responded to comprehension questions. The critical sentences included the construction Noun+Acc/Gen+Adv+verb shown in (1). Unlike Momma et al. (2016), we added an adverb between N+Acc/Gen and the verb so that we can examine possible delayed effects as well as the direct effects. We also manipulated syntactic/semantic violations in a within-subjects design: 1) Grammaticality (a morphosyntactic cue): Grammatical (N+Acc) vs. Ungrammatical(N+Gen) (cf. 1), and 2) Plausibility (a semantic cue): Plausible vs Implausible. Fixation durations in the main verb region were analyzed with LMMs, including Grammaticality and Plausibility as fixed effects, and participants and items as random effects. If native speakers of Korean rely primarily on syntactic cues in structure prediction, an increased RT in the ungrammatical condition compared to the grammatical condition will be observed. If they primarily rely on semantic/heuristic cues, an increased RT in the implausible condition compared to the plausible condition is expected. If Korean speakers are sensitive to both syntactic and semantic manipulations, a reliable interaction between the two fixed effects will be observed.

Results: We found a significant interaction between syntactic and semantic cues ($t=2.94$, See Figure 1) in FFD. We also found a significant effect of Plausibility in GD ($t=-3.60$, See Figure 2), TVT ($t=-3.88$, See Figure 3) and RPD ($t=-3.84$, See Figure 2). These results show that native speakers of Korean rely primarily on semantic/heuristic cues to predict an upcoming verb instead of relying on morphosyntactic cues. In order to see if there is any syntactic effect that was overridden by semantic/heuristic effects, we conducted a further analysis with only plausible sentences. In the analysis, we found a significant effect of grammaticality in RPD ($t=-2.67$, See Figure 4), but in other measures, there was no effect.

Conclusion: In sum, the fact that we failed to find an effect of grammaticality in GD, TVT and RPD suggests that Korean speakers rely primarily on semantic/heuristic cues when making a prediction about an upcoming verb. The findings of this study are not aligned with Momma et al. (2016) which found that changing case markers affected the predictability of the upcoming verb if it changes syntactic category. The results provide supporting evidence for Kim & Osterhout (2005), Ferreira & Patson (2007) and Momma et al. (2015), showing that syntactic cues are overridden by heuristics-based semantic cues/processors. The fact that we found an interaction between syntactic and semantic cues in FFD, couple with the fact that we found the significant grammaticality effects with plausible sentences only, however, shows the possibility that there is indeed a syntactic effect which has been overridden by strong semantic/heuristic effects. Further research will be needed to investigate the possibility.

Example Stimuli

(1) a. N+Acc, plausible condition

Hansepi-nun hyeyci-ka onul sa-n **cwusu-lul** honca **masi-ess-ta-ko** malhay...
 Hansup-Top Hyeji-Nom today bought-Rel **juice-Acc** alone **drink-Pst-Decl-Comp** tell...

b. N+Gen, plausible condition

Hansepi-nun hyeyci-ka onul sa-n **cwusu-uy** honca **masi-ess-ta-ko** malhay...
 Hansup-Top Hyeji-Nom today bought-Rel **juice-Gen** alone **drink-Pst-Decl-Comp** tell...

c. N+Acc, implausible condition

Hansepi-nun hyeyci-ka onul sa-n **sikyey-lul** honca **masi-ess-ta-ko** malhay...
 Hansup-Top Hyeji-Nom today bought-Rel **watch-Acc** alone **drink-Pst-Decl-Comp** tell...

d. N+Gen, implausible condition

Hansepi-nun hyeyci-ka onul sa-n **sikyey-uy** honca **masi-ess-ta-ko** malhay...
 Hansup-Top Hyeji-Nom today bought-Rel **watch-Acc** alone **drink-Pst-Decl-Comp** tell...

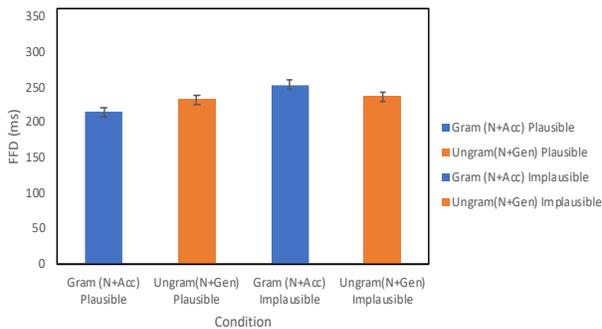


Figure 1. FFD

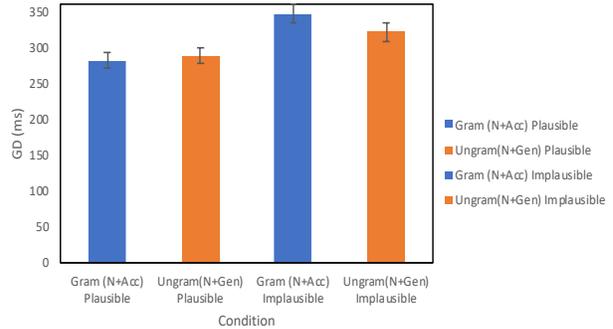


Figure 2. GD

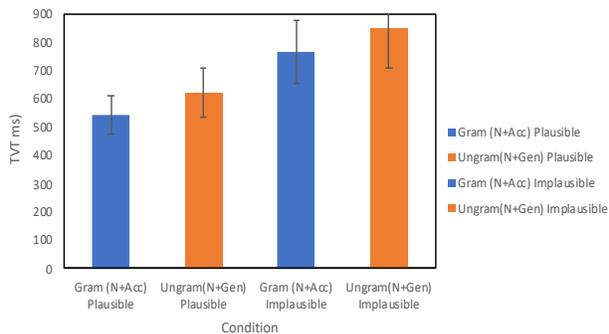


Figure 3. TVT

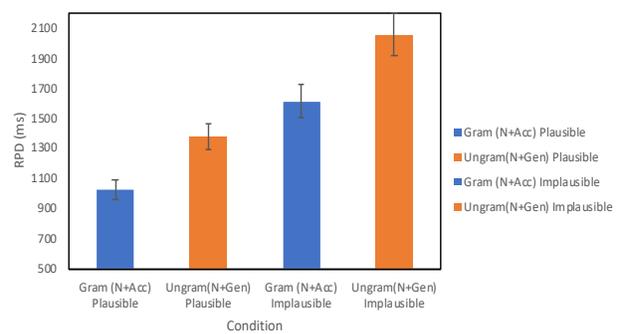


Figure 4. RPD

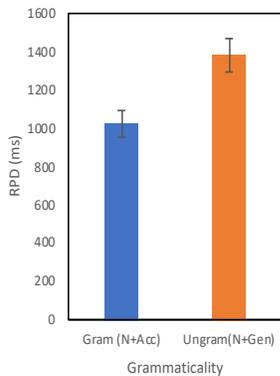


Figure 5. RPD (Plausible sentences only)

Selected References

- (1) Kim, A., & Osterhout, L. (2005). The independence of combinatory semantic processing: Evidence from event-related potentials. *Journal of memory and language*, 52(2), 205-225. (2) Ferreira, F., & Patson, N. D. (2007). The 'good enough' approach to language comprehension. *Language and Linguistics Compass*, 1(1-2), 71-83. (3) Momma, S., Slevc, L. R., & Phillips, C. (2016). The timing of verb selection in Japanese sentence production. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 42(5), 813. (4) Momma, S., Sakai, H., Luo, Y., & Phillips, C. (2016). Lexical predictions and the structure of semantic memory: EEG evidence from case changes. Talk given at the 29th annual CUNY Conference on Human Sentence Processing, Gainesville, FL. March 3-5.