

An ERP study of voice mismatch in pseudo-slucing of Korean

Voice mismatch is not permissible in Sluicing of English (e.g., **Someone bought roses, but we don't know by who(m)*), and it has been attributed to a syntactic factor in terms of the size of an elided category (Merchant, 2007) or a non-syntactic factor in terms of a resemblance relation (Kehler, 2000, 2002). The impossibility of voice mismatch in Sluicing of English has been intensively examined in theoretical linguistics, but relatively a few studies have examined whether voice mismatch in Sluicing is also disallowed in other languages (cf. González, 2011). In addition, a little experimental research has investigated whether people judge voice mismatch in Sluicing acceptable or not (SanPietro, Xiang, & Merchant, 2012), and whether people exploit syntactic structure during online processing of ellipsis (Yoshida, Dickey, & Sturt, 2013), but little work has provided electrophysiological evidence for ellipsis. In this study, we examined voice mismatch in Pseudo-Sluicing (PS) of Korean by conducting an offline acceptability task and an event-related brain potential (ERP) experiment. The experiment employed 180 sets of six elliptical conditions in Korean, composed of both the 2 voice types by 2 (mis)match conditions in (A)-(D) and the two conditions in (E)-(F) with or without a correlate involving Chung's (2005) lexico-syntactic requirement; the remnants and their correlates are highlighted and underlined.

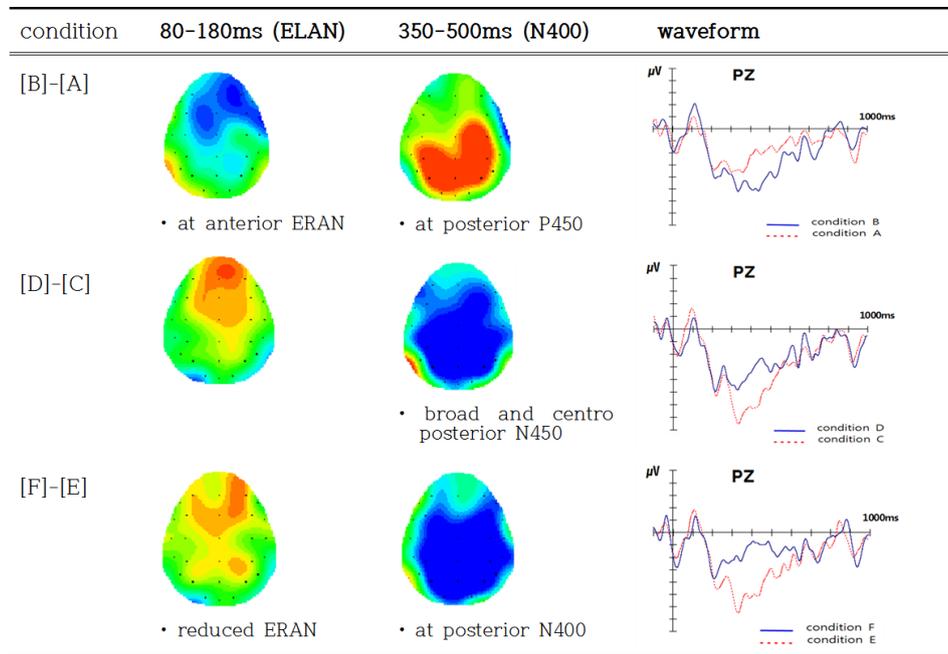
- (A) [eckuceynwukwunka-kakunamwu-lul call-ass-tako] Yengi-kamalhayss-nuntey, [nwukwu-inci] mollassessta.
 yesterdaysomeone-Nom that tree-Accut-Past-Comp Yengi-Nom said-Circumwho-Interrogdidn't know
 'Though Yengi said that someone cut the tree yesterday, I didn't know who.'
- (B) [eckuceynwukwunka-kaunamwu-lul call-ass-tako] Yengi-kamahayss-nuntey, [nwukwu-evuyhavse-inci] mollassessta
 yesterday someone-Nom that tree-Acc cut-Past-Comp Yenghi-Nom said-Circumwho-by-Interrogdidn't know
 'Though Yengi said that someone cut the tree yesterday, I didn't know who by.'
- (C) [eckuceyunamwu-kanwukwunka-evuyhavsecalli-ess-tako] yengi-kamalhayss-nuntey, [nwukwu-eyuyhavse-inci] mollassessta.
 yesterday that tree-Nom someone-bybe cut-Past-Comp Yengi-Nom said-Circumwho-by-Interrog didn't know
 'Though Yengi said that the tree was cut by someone yesterday, I didn't know who by.'
- (D) [eckuceyunamwu-kanwukwunka-evuyhavsecalli-ess-tako] yengi-kamalhayss-nuntey, [nwukwu-inci] mollassessta
 yesterday that tree-Nom someone-bybe cut-Past-Comp Yenghi-Nom say-Circumwho-Interrog didn't know
 'Though Yengi said that the tree was cut by someone yesterday, I didn't know who by.'
- (E) [eckuceyunamwu-kacalli-ess-tako] yengi-kamalhayss-nuntey, [nwukwu-evuyhavse-inci] mollassessta
 yesterday that tree-Nom be cut-Past-Comp Yengi-Nom said-Circumwho-by-Interrogdidn't know
 'Though Yengi said that the tree was cut by someone yesterday, I didn't know who by.'
- (F) [eckuceyunamwu-kacalli-ess-tako] yengi-kamalhayss-nuntey, [nwukwu-inci] mollassessta
 yesterday that tree-Nom be cut-Past-Comp Yengi-Nom said-Circumwho-Interrogdidn't know
 'Though Yengi said that the tree was cut yesterday, I didn't know who.'

Seventeen Korean speakers (10 males and 7 females, mean age 22.6; SD: 3.0, range 18-29) participated in the experiment. The descriptive data of the offline acceptability task are as follows:

Agent Type	Explicit Agent - active sentence		Explicit Agent - passive sentence		Implicit Agent - passive sentence	
	match	mismatch	match	mismatch	match	mismatch
Mean acceptability Scale (1: very bad, 4: very good)	3.3	2.0	3.3	2.0	3.2	1.5

The ANOVA results of the offline task show that there are main effects of Agent type (i.e. correlate vs. no correlate) and voice (mis)match. In fact, Korean speakers consistently judged all the three voice mismatch

conditions in PS unacceptable, and the mismatch in the correlate-less, implicit Agent (F)-condition was rated the worst among the conditions. These results were consistent with the ERP results as well. ERPs were measured at the remnant word (plus the Q marker) in the elliptical clause like *nwukwu-i-nci* 'who-Cop-Q'. At the critical word in each mismatch condition, different ERP components were obtained (as below).



When the antecedent clause hosts a correlate to the remnant, voice mismatch (i.e. a switch from active to passive) in Condition-B relative to Condition-A elicited an early right anterior negativity (ERAN) at the 80-180 ms interval, followed by P450 at posterior regions. Likewise, with a correlate to the remnant, voice mismatch (i.e. a switch from passive to active) in Condition-D relative to Condition-C evoked an N450 at posterior regions. On the other hand, without a correlate to the remnant, voice mismatch (i.e. a switch from passive to active) in Condition-F relative to Condition-E elicited an N400 at posterior regions.

The results of our study point to the fact that the voice mismatch without a correlate (Condition-F involving a violation of Chung's (2005) requirement) evoked an N400 reflecting a downright semantic anomaly that cannot be repaired by any syntactic operation. Assuming that either P450 or N450 is an index of conflict processing (Liu, Yaob, Zuowei, Wang, & Zhou, 2014; Lansbergen, van Hell, & Kenemans, 2007), we take either a P450 or N450 evoked from voice mismatches with a correlate in the antecedent clause (Conditions-B & D) to reflect the fact that the Case/postposition marker on the remnant does not match with the corresponding marker on its correlate, causing a conflict in processing on the part of a parser. Meanwhile, the elicitation of an ERAN (which as a variant of ELAN is generally known to index a word-category violation in a more complex environment) from Condition-B relative to the Condition-A is attributed to the use of the complex form of postposition as a marker of Agent in a passive sentence relative to the simplex form of Case marker for Agent subject in an active sentence. All in all, the ERP results make a strong case for the differentiation of voice mismatch from a violation of Chung's (2005) requirement.