Crosslinguistic influence modulates L2 speakers' offline but not online processing of implicit causality

Hyunwoo Kim & Theres Grüter (University of Hawai'i at Mānoa)
hyunwoo2@hawaii.edu

Crosslinguistic activation is well-attested in bilinguals' lexical and syntactic processing. Less is known about the consequences of cross-language activation at the lexical level on referential biases at a *discourse* level, a domain of ongoing investigation in the L2 processing literature.[1],[2] This study investigates how the strength of referential biases associated with implicit vs explicit causality predicates in Korean affects Korean-English bilinguals' reference processing in English during written sentence completion (Exp1) and real-time listening (Exp2). Implicit causality (IC) is a well-known phenomenon whereby certain verbs create biases to remention either its subject or object in a causal dependent clause.[3] Importantly, some English IC verbs can only be translated into Korean involving explicit causality (EC) marking (see 1a). Previous work has shown stronger subject bias with EC than with (subject-biased) IC predicates among native Korean speakers in their L1 Korean, and in their L2 English for translation equivalents of Korean EC vs IC verbs, all of which are lexical IC verbs in English, suggesting crosslinguistic influence of bias-strength associated with L1 construction type on L2 referential processing.[4] Here we ask whether these effects replicate with a more controlled set of predicates (RQ1), are modulated by L2 proficiency (RQ2), and extend to real-time processing (RQ3).

Method: In Exp1, 62 Korean-English bilinguals (NNS) completed a written sentence completion task comprised of 24 subject-biased (all class 31.1[5]; 12 with lexical (IC), 12 with EC-construction translation equivalents in Korean, (1a&b)) and 24 object-biased verbs. In Exp2, a different group of 52 NNSs listened to items containing the same 48 verbs (see (2)) and 48 non-IC verbs while looking at scenes showing the two referents (Fig1). NNSs in Exps 1 and 2 were matched for proficiency, as measured by LexTALE (M=74, range: 31-100 in Exp1; M=71, range: 50-96 in Exp2) and a cloze test (M=28, range: 3-48 in Exp1; M=27, range: 5-45 in Exp2). Native English speakers (NS) served as controls (Exp1: n=40; Exp2: n=52) and were predicted to show no differences in bias-strength between the two types of NP1-biased verbs (IC, EC).

Results: In Exp1, we used mixed-effects logistic regression to examine the effects of *Predicate type* (EC, IC) and *proficiency* on the likelihood of the subordinate subject referring to the matrix subject. *Predicate type* interacted with *Group* (b=0.70, p=.009), with stronger subject-bias in EC than IC predicates in the NNS (b=0.98, p<.001) but not the NS group (Fig2). Neither LexTALE (b=–0.27, p=.11) nor cloze scores (b=–0.11, p=.50) interacted with *Predicate type*.

In Exp2, participants' preference for fixating NP2 vs NP1 referents was analyzed in four successive temporal windows (Fig3). For each window, two LME models were fit: one to the entire data with *Group* (NS, NNS) and *Verb type* (NP1, NP2) as fixed effects, and one to the NP1-data only with *Group* and *Predicate type* (EC, IC) as fixed effects. Results from the first set of models showed an interaction of *Group* and *Verb type* (b=3.39, p=.020) in the first window, driven by a significant IC effect in the NS group only. In all subsequent windows, only main effects of verb type emerged, yet the IC effect within the NNS group did not emerge until the last window (Pro+3; b=3.33, p=.01). These findings suggest similar, albeit delayed, processing of IC in L2 as in L1. The second set of models showed no robust effects or interactions involving *Predicate type* (EC, IC). The addition of proficiency did not improve the fit of any models.

Conclusions: Exp1 replicated offline effects of cross-language influence of IC bias strength (RQ1✓). Exp2 showed evidence of NNS' incremental, albeit delayed, use of IC bias in real-time listening; yet no clear effects of cross-language activation emerged in NNS' real-time processing (RQ3✗). Proficiency did not modulate NNS' offline or online performance (RQ2✗). Overall, these findings confirm previously observed effects of lexical co-activation on bilinguals' offline reference choices. The absence of these effects during real-time processing, together with the delayed emergence of the general IC effect in NNSs, suggests that increased processing demands may lead to attenuation of crosslanguage activation.

(1) *Sample items from the sentence-completion task (Exp1) (with Korean translations below)*

a. Eliza surprised Natalie because _____. (EC type, *k* = 12)

Eliza-nun	Natalie-lul	nolla-**key**	**ha**-yess-nuntey	waynyahamyen
Eliza-NOM	Natalie-ACC	be surprised-RESULT	do-PAST-connective	because

b. Celine provoked Nancy because_____. (IC type, *k* = 12)

Celine-un	Nancy-lul	topal-ha-yess-nuntey	waynyahamyen
Celine-NOM	Nancy-ACC	provoking-do-PAST-connective	because

(2) *Example of linguistic stimuli in Exp2*

(Context) Justin and Steve met each other at a Halloween party last year.
(Critical) Justin frightened Steve at first sight because he was wearing a ghost costume.
(Question) Who was wearing a ghost costume?

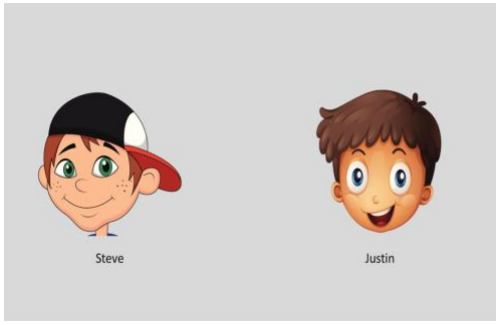

Figure 1. Sample of visual stimuli

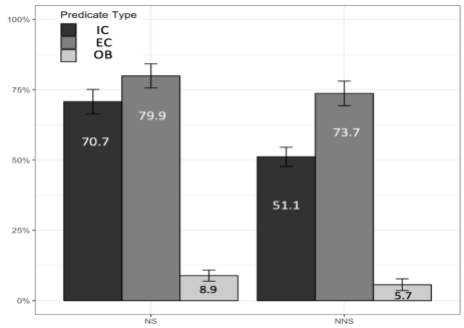

Figure 2. Mean percentage of subject reference in Exp1; error bars indicate 95% CIs

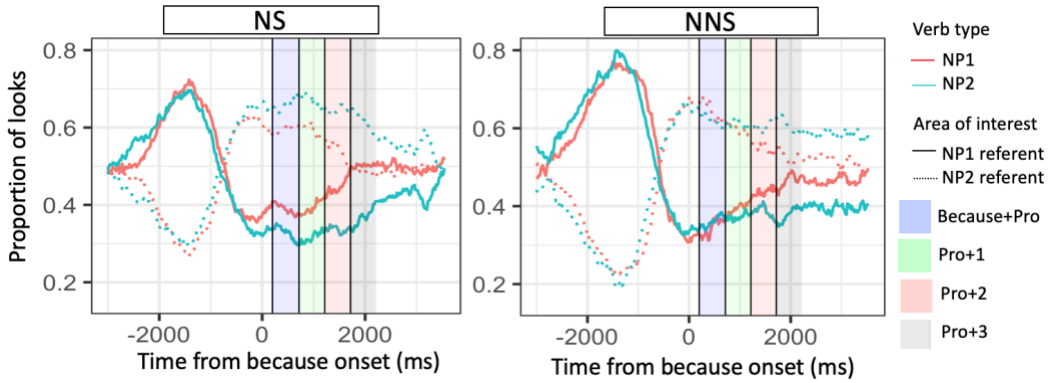

Figure 3. Exp2: Time course of fixations across the trial for the critical sentences by verb type (NP1, NP2) and area of interest (AOI: NP1-, NP2-referent) starting from *because* onset (0ms); Because+Pro: onset of *because* - pronoun offset (520ms), Pro+1: pronoun offset - 500ms after pronoun offset, Pro+2: 500ms - 1000ms after pronoun offset, Pro+3: 1000 - 1500ms.

References

[1] Foucart et al. (2016) Discourse comprehension in L2: Making sense of what is not explicitly said. *Brain and language*; [2] Grüter et al. (2017). Coreference and discourse coherence in L2: The roles of grammatical aspect and referential form. *Linguistic Approaches to Bilingualism*; [3] Hartshorne. (2014). What is implicit causality? *Language, Cognition and Neuroscience;* [4] Kim & Grüter. (2018). Cross-linguistic activation of implicit causality biases in Korean learners of English. *Bilingualism: Language and Cognition*; [5] Levin. (1993). *English verb classes and alternations: A preliminary investigation*.