

NEGATIVE POLARITY ILLUSION IN KOREAN*

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1 Introduction

Negative Polarity Illusion refers to the phenomenon that a potential licenser interferes the judgment of a negative polarity item (NPI) even though it is not in the proper licensing position. When processing the ungrammatical sentence **The boy that no girl liked ever arrived on time*, for example, speakers tend to be attracted by the intrusive negation *no girl* and potentially judge the sentence as grammatical. While there are a growing number of studies on NPI illusion as it provides important insights into the linguistic properties of NPIs as well as human language processing mechanisms, most of the previous studies have been on a typologically limited set of languages including English and German. Moreover, the potential influence of prosody on NPI illusion is yet to be investigated.

In this study, we explore the case of Korean to see whether this language exhibits NPI illusion, and if so, whether it is affected by prosody. The paper is organized as follows. Section 2 overviews previous studies on NPI illusion and presents the syntactic and semantic properties of NPIs in Korean that pose a challenge to the existing accounts, and proposes hypotheses on NPI illusion in Korean. Section 3 and 4 present two experiments to test the hypotheses. Section 5 discusses the results of the experiments and Section 6 concludes the paper.

2 Background

2.1 Negative Polarity Illusion

A negative polarity item (NPI) (e.g., *ever* or *any* in English) must occur within the scope of an appropriate licensor (e.g., negation) (Ladusaw 1979). For example, the sentence (1b) is ungrammatical because there is no licenser for the NPI *ever*, unlike (1a).

*WE WOULD LIKE TO THANK THE AUDIENCE AT THE WAFL 13 FOR HELPFUL FEEDBACK, ESPECIALLY CHRISTOPHER DAVIS, SATOSHI TOMIOKA, AND SHIGERU MIYAGAWA. WE WOULD ALSO LIKE TO THANK ANONYMOUS REVIEWERS FOR THEIR VALUABLE COMMENTS ON THIS PAPER.

- (1) a. No boy **ever** arrived on time.
 b. *The boy **ever** arrived on time.

However, online studies have shown illusory licensing effects of NPIs: speakers may sometimes accept ungrammatical NPIs when a potential licenser is not in the proper licensing position. For example, the sentence (2b) is ungrammatical because the scope of the negation is limited to the relative clause and it cannot license the NPI in the matrix clause. However, it has been observed that speakers often judge sentences such as (2b) as grammatical because of the intruding negation in it. This phenomenon can be called an ‘illusion’ because the effect is fleeting; the speakers judge sentences like (2b) as unacceptable when they are given enough time for reflection (Parker and Phillips 2016). Such NPI illusion effects have been found across online processing studies in various measures, including speeded acceptability judgment, self-paced reading, eye tracking, and ERP (e.g., Drenhaus et al. 2005, Vasishth et al. 2008, Xiang et al. 2009, Parker and Phillips 2016, Yanilmaz and Drury 2017).

- (2) a. No boy that [the girl liked] **ever** arrived on time.
 b. *The boy that [no girl liked] **ever** arrived on time.
 c. *The boy that [the girl liked] **ever** arrived on time.

Then, what causes NPI illusion? There have been at least two different accounts for NPI illusions. First, a *syntactic account* (e.g., Vasishth et al. 2008) explains that NPI illusion occurs when syntactic requirements for NPI licensing are partially matched. An NPI requires a licenser that bears a [+negative] feature and is in a c-commanding position. In online processing, however, the parser can be satisfied by a potential licenser that only matches a [+negative] feature, even if it is not in the c-commanding position. This is an intuitive and simple account, and it has a benefit that the same explanation can apply to other kinds of linguistic illusion effects, such as agreement attraction (e.g., Wagers et al. 2009).

However, some NPI licensers do not contain a lexically coded [+negative] feature, yet they induce NPI illusion effects. For example, the sentence (3) shows an NPI illusion effect because of the potential licenser *only* (Xiang et al. 2009), but the lexical item *only* itself obviously does not bear a [+negative] feature.

- (3) *The documentaries that [only network TV stations have played during prime time] have **ever** been very controversial.

A possible account for the NPI licensing mechanism for apparent non-negative licensers such as *only* is that pragmatic inference, or implicature, can create a negative context. Xiang et al. (2009) notes that restrictive relative clauses such as (4a) generally induce negative inferences about a contrastive set of referents as in (4b). Based on this observation, they propose a *pragmatic account* that an NPI illusion effect that the sentence (5a) is wrongly judged as grammatical is due to the erroneous pragmatic inference that yields a grammatical sentence such as (5b).

- (4) a. The students [who had studied more than 10 hours a week] passed the exam.
 b. The students [who had studied 10 or fewer hours a week] did not pass the exam.

- (5) a. *The boy that [no girl liked] **ever** arrived on time.
 b. The boys that [girls liked] did not **ever** arrive on time.

A further prediction of the pragmatic inference account is that an NPI licenser in a complement clause should not show an NPI illusion effect. Results from Parker and Phillips (2011) seem to support this prediction because they found a weaker illusion effect for complement clauses such as (6) than relative clauses.

- (6) *The fact [that no student passed the exam] **ever** surprised the teacher.

However, the pragmatic approach does not explain all NPI illusion phenomena, either. Studies have found that NPI illusion effects are not across-the-board, but rather selective: only certain types of NPIs and negation can cause illusions, at least in English. For example, the NPI *ever* elicits an illusion, but *any* does not, as shown in the comparison between (7a) and (7b) (Parker and Phillips 2016). Also, quantificational negation (e.g., *no*) elicits an NPI illusion, but sentential negation (e.g., *not*) does not, as shown in the comparison between (7a) and (7c) (de Dios-Flores et al. 2017). Notice that neither the pragmatic account nor the syntactic account predicts these selective NPI licensing effects.

- (7) a. *The authors [that no critics recommended] have **ever** received a prize.
 (→ Illusion)
 b. *The authors [that no critics recommended] have have received **any** prize.
 (→ No Illusion)
 c. *The authors [that the critics did not recommend] have **ever** received a prize.
 (→ No Illusion)

Studies have also found that the illusory licensing effect of NPIs can be switched off. For example, Parker and Phillips (2016) report that an NPI illusion was observed in sentences such as (8a) but not in (8b), even though (8a) and (8b) are identical except for the position of the parenthetical phrase *as the editor mentioned*. A possible explanation is that in (8b), the parenthetical phrase intervenes between the negation and the NPI and thus increases the distance between them, which provides human processors with more time to reflect on the sentence and detect the ungrammaticality. A similar modulating effect was found in Turkish NPI illusion (Yanilmaz and Drury 2017). Thus, it can be said that the time between the licensers and the NPI is a factor modulating NPI illusion.

- (8) a. *As the editors mentioned, the authors [that no critics recommended for the assignment] have **ever** received a pay raise.
 (→ Illusion)
 b. *The authors [that no critics recommended for the assignment] have, as the editors mentioned, **ever** received a pay raise.
 (→ No Illusion)

2.2 Negative Polarity Items in Korean

The syntax and semantics of NPI constructions in Korean are quite different from those in English or German, the languages that have been investigated in most previous studies on NPI illusion.

Semantically, Korean has much more restricted NPI licensors. While NPIs in English can appear in apparently non-negative constructions such as questions (e.g., *Have you **ever** been to Tokyo?*) or conditionals (e.g., *If you see **anyone** there, let me know.*), Korean NPIs cannot appear in those contexts. Also, Korean does not have negative determiners such as *no* in English, thus sentential negation is required to license NPIs. Syntactically, an NPI should be in the same clause with its licensor in Korean (Sohn 1995). Furthermore, Korean NPIs precede their licensors in the sentence because Korean is a head-final language, as in (9). This is contrary to English NPIs, which appear after their licensors.

- (9) *Keni-nun **amwuto** mannaci-anh-ass-ta.*
 Ken-TOP anyone meet-NEG-PST-DCL
 ‘Ken did not meet **anyone**.’

Bearing these factors in mind, this study aims to answer two questions regarding Korean NPI processing. The first question is if NPI illusion appears in Korean despite the distinctive grammatical factors which can potentially affect how Korean speakers process NPIs. An ERP study (Yanilmaz and Drury 2017) finds an illusory licensing effect for NPI constructions such as (10) in Turkish, where NPIs precede their licensors as in Korean, thus we would expect NPI illusion to obtain for similar constructions in Korean (11).

- (10) **Kimse* [Ali'nin çalış-ma-dığ-ı]-ni söyle-di
 anybody [Ali-gen work-NEG-fn-agg]-acc say-PST.3sg
 (Lit.) ‘Anybody said that Ali didn’t work.’
- (11) **Amwuto* [Tayeni-ka Swukyengi-lul ttaylyci-anh-ass-ta-ko] malhay-ss-ta.
 anyone [Tayen-NOM Swukyeng-ACC beat-NEG-PST-DCL-CMP] say-PST-DCL
 ‘(Lit.) Anyone said that Tayen didn’t beat Swukyeng.’

The second question is whether prosody can affect NPI illusion. We have seen that the time between the NPI and negation in processing is a modulating factor for NPI illusion. In this study, we explore if prosody can be another factor modulating NPI illusion. In spoken Korean, the prosodic boundaries of the embedded clause can be optionally marked (cf. Jun 2005, Yim and Dobashi 2016). If the clause boundaries are prosodically marked, it would provide an additional signal that the NPI and the negation are in the different clauses, and it might help the comprehenders avoid being attracted by intruding negation. The following section describes two experiments we have conducted to seek answers to these two questions.

3 Experiment 1: Text Processing

3.1 Stimuli

The stimuli consisted of three types of sentences depending on the NPI licensing condition. The first type involved both NPI and negation in the matrix clause, indicating a *grammatical licensor* (12a). The second type had an NPI in the matrix clause, and negation in the embedded clause, indicating an *ungrammatical licensor*, which could be potentially intruding (12b). The third type only had an NPI but *no licensor* at all (12c).

- (12) a. *Amwuto* [*Tayeni-ka Swukyengi-lul ttayly-ess-ta-ko*] *malhaci-anh-ass-ta*.
 anyone [Tayen-NOM Swukyeng-ACC beat-PST-DCL-CMP] say-NEG-PST-DCL
 ‘(Lit.) Anyone didn’t say that Tayen beat Swukyeng.’ = ‘Nobody said that Tayen beat Swukyeng.’
- b. **Amwuto* [*Tayeni-ka Swukyengi-lul ttaylyci-anh-ass-ta-ko*] *malhay-ss-ta*.
 anyone [Tayen-NOM Swukyeng-ACC beat-NEG-PST-DCL-CMP] say-PST-DCL
 ‘(Lit.) Anyone said that Tayen didn’t beat Swukyeng.’
- c. *Amwuto* [*Tayeni-ka Swukyengi-lul ttayly-ess-ta-ko*] *malhay-ss-ta*.
 anyone [Tayen-NOM Swukyeng-ACC beat-PST-DCL-CMP] say-PST-DCL
 ‘(Lit.) Anyone said that Tayen beat Swukyeng.’

Twelve target stimuli (3 licensing conditions \times 4 sentences) were chosen and distributed across four sets in a pseudo-Latin square design.¹ Each participant was presented with one of the four sets of the target sentences intermingled with 36 filler sentences. The assignment of the stimuli set was random but even.²

3.2 Participants

48 adult native Korean speakers (age > 18) participated in the experiment. They were recruited through various ways including advertisement in social networking services and personal solicitation by email. Participation in the experiment was anonymous and voluntary.

3.3 Procedure

The experiment was conveyed through the Internet, using the Qualtrics online survey tool. The participants read each sentence displayed its entirety on the screen and rated the acceptability using a 7-point scale (6: most acceptable, 0: least acceptable). There was no time restriction to complete the task.

3.4 Results

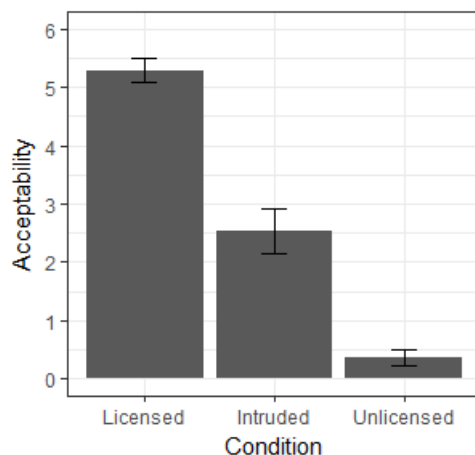
Figure 1 displays the mean acceptability of the sentences in three different conditions. It clearly shows that the NPIs with grammatical licensors were perceived as grammatical (mean: 5.29) and the NPIs with no licensors as ungrammatical (mean: 0.37), while the acceptability of the NPIs with intruding licensors was in between the two cases (mean: 2.54). A mixed effects linear

¹The original Latin square design uses an $n \times n$ array, but in our experiments we had to use $n \times m$ arrays because the two factors (i.e., NPI licensing conditions and sentences) had different numbers of levels. We tried to distribute the stimuli in a way that the random effect of a specific condition or a specific set of sentences should minimize. The table below shows how the stimuli were distributed among four different sets. The numbers (1-4) indicates the sentence numbers shown in the Appendix and the letters (A-D) indicate the sets of stimuli.

Sentences	(1)	(2)	(3)	(4)
Licensed	D	C	B	A
Intruded	C	B	A	D
Unlicensed	B	A	D	C

²The assignment was controlled by the Qualtrics survey tool. The distribution of the sets of stimuli among subjects was not completely even in the end because there were subjects who quit before the end of the experiment. The number of subjects for each set of stimuli ended up as follows: Set A: 13, Set B: 11, Set C: 13, Set D: 11.

Figure 1: Acceptability rate of text processing



regression indicates that the acceptance rate of the intruded condition was significantly higher than the unlicensed condition ($p < .001$), which manifests that there is an intrusion effect on NPI processing in Korean.

4 Experiment 2: Audio Processing

4.1 Stimuli

The same sentences as in Experiment 1 were used, but each sentence was recorded twice by manipulating the presence and absence of the prosodic boundaries of the embedded clause, as schematically illustrated in (13) (IP: Intonation Phrase; see Jun 2005). Figure 2 displays the actual pitch tracks of the sentence (12b).

- (13) a. Unmarked: (SBJ_{MAT} SBJ_{EMB} OBJ_{EMB} Verb_{Emb} Verb_{MAT} L%)_{IP}
 b. Marked: (SBJ_{MAT} L(H)%)_{IP} (SBJ_{EMB} OBJ_{EMB} Verb_{Emb} L(H)%)_{IP} (Verb_{MAT} L%)_{IP}

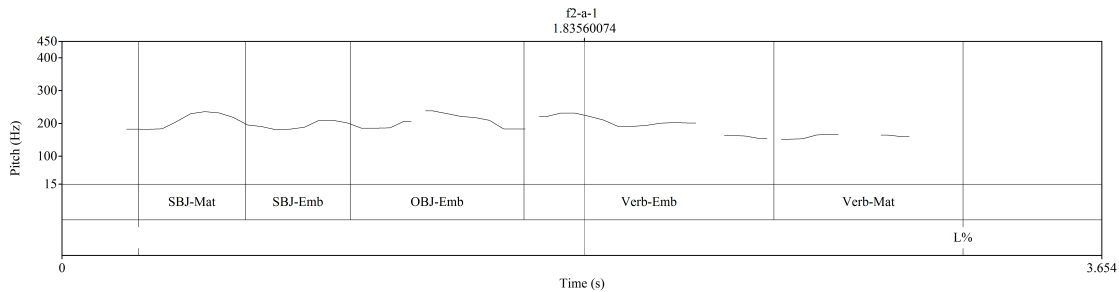
The second author, a native speaker of Korean, recorded the stimuli in a sound-attenuated booth in the Phonetics Lab at Stony Brook University. All the participants recruited for both of the two experiments were from the same region in Korea where the second author was from. 24 target stimuli (3 licensing conditions \times 4 sentences \times 2 prosody types) were created and distributed across four sets in a pseudo-Latin Square design.³ Each participant was presented with one of

³See Footnote 1 for the reason why a pseudo-Latin square design was adopted. The table below shows how the stimuli were distributed among four different sets (A-D).

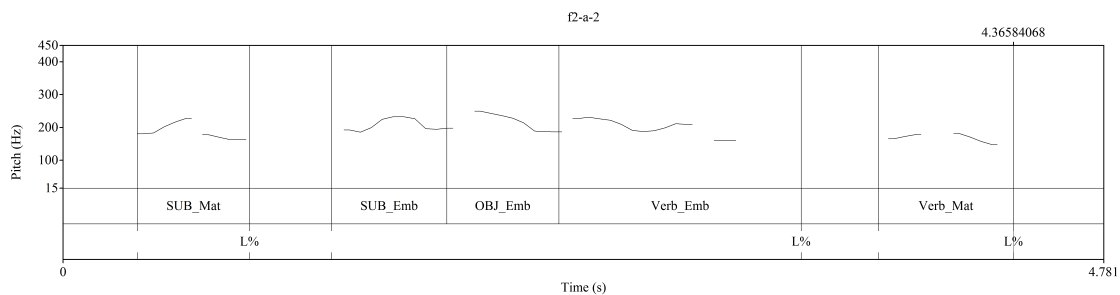
Sentences		(1)	(2)	(3)	(4)
Types	Licensed (no boundary)	A	B	D	C
	Licensed (boundary)	C	A	B	D
	Intruded (no boundary)	B	D	C	A
	Intruded (boundary)	D	C	A	B
	Unlicensed (no boundary)	A	B	D	C
	Unlicensed (boundary)	B	D	C	A

Figure 2: Examples of pitch tracks

(a) No prosodic boundaries for embedded clause



(b) With prosodic boundaries for embedded clause



the four sets of the target sentences intermingled with 42 filler sentences. The assignment of the stimuli set was random but even.⁴

4.2 Participants

112 adult native Korean speakers (age > 18) participated in this experiment in the same way as in Experiment 1. Participation in the experiment was anonymous and voluntary.

4.3 Procedure

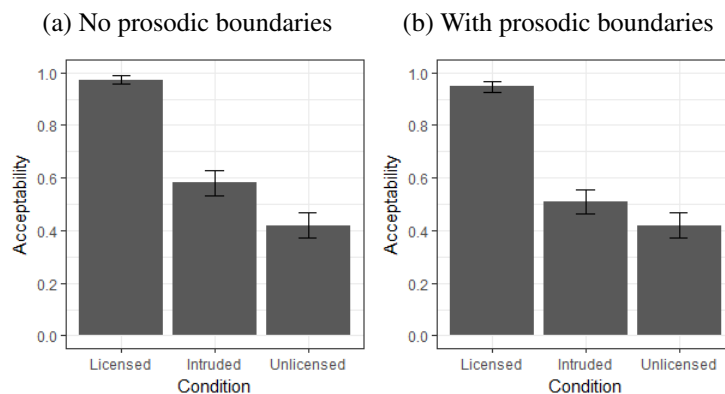
The experiment was conveyed through the Internet, using the Qualtrics online survey tool. Participants were instructed to click a button on the screen to listen to the sentence and then made a forced choice for an appropriate paraphrase of the sentence. For example, the paraphrases given for the stimuli (12) included ‘nobody said anything’, ‘somebody said something’, and ‘impossible to paraphrase’. In the analysis, the choice ‘impossible to paraphrase’ was singled out as an indicator of unacceptability. There was no time restriction to complete the task.

4.4 Results

Figure 3 compares the results for the stimuli without and with prosodic boundaries of the embedded clause, respectively. A mixed effects logistic regression was conducted to confirm the statistical significance of the results. When the embedded clause boundaries were not prosodically marked

⁴See Footnote 2 for the details about the stimuli assignment. The number of subjects for each set of stimuli ended up as follows: Set A: 25, Set B: 25, Set C: 33, Set D: 29.

Figure 3: Acceptability rate of audio processing



(Figure 3a), we obtained an NPI illusion effect: the acceptance rate was significantly higher for the intruded condition than the unlicensed condition ($p < .01$). This indicates that an NPI intrusion effect in Korean appears not only in text processing, but in auditory processing as well. On the other hand, when the embedded clause boundaries were prosodically marked (Figure 3b), there was no statistically significant difference between the intruded and the unlicensed conditions ($p = .07$). This suggests that the NPI intrusion effect may be alleviated by prosody.

5 Discussion

The results of the two experiments confirm the existence of NPI illusion in Korean and the influence of prosody on NPI illusion. Furthermore, the experimental results suggest that Korean has a stronger NPI illusion effect than English. Recall that the NPI *any* and sentential negation have been reported not to cause NPI illusion in English (Parker and Phillips 2016, de Dios-Flores et al. 2017), while our experiments show that they do cause NPI illusion in Korean. Also, the illusory licensing effect in English did not appear when the speakers had enough time to reflect (Parker and Phillips 2016), but in our study the offline judgment on Korean NPIs without any time restriction still manifested an illusory licensing effect.

A possible explanation for the strong NPI illusion effect in Korean is that NPI illusion is caused by the expectation of NPI-negation dependency (Yanilmaz and Drury 2017, de Dios-Flores et al. 2017). In languages such as English, where negation precedes NPIs, NPI-negation dependency is not yet established when negation is encountered. At this point, speakers can utilize relative frequency information to make a prediction on the upcoming NPI. For example, de Dios-Flores et al. (2017) present a corpus study that shows contexts with a negative quantifier *no* were six times more likely to also contain *ever* than were contexts with sentential negation *not*, and argue that sentential negation does not create a strong expectation for upcoming NPIs in English, which could be the reason why only negative quantifiers cause NPI licensing illusion in English. On the other hand, in Korean (and Turkish), where NPIs precede negation, the NPI-negation dependency is predicted as soon as an NPI is encountered. This could be the cause of the strong illusory effects of NPI licensing in Korean.

6 Conclusion

In this study, we have conducted experiments regarding Korean NPI processing and found that i) NPI licensing illusion does appear in Korean, both in text and auditory processing, ii) NPI illusion can be strong enough to appear in offline processing, and iii) adding prosodic information may lessen the likelihood of illusion.

7 Appendix

The list of target stimuli used in the experiments are listed below. Only grammatical sentences are presented here to save space. Three different types of stimuli (i.e., grammatical licensor, ungrammatical licensor, no licensor) were derived from each sentence as illustrated in (12).

- (14) *Amwuto* [*Tayeni-ka Swukyengi-lul ttayly-ess-ta-ko*] *malhaci-anh-ass-ta*.
 anyone [Tayen-NOM Swukyeng-ACC beat-PST-DCL-CMP] say-NEG-PST-DCL
 ‘Nobody said that Tayen beat Swukyeng.’
- (15) *Amwuto* [*Chelswu-ka Minci-lul cohaha-n-ta-ko*] *somwunnayci-anh-ass-ta*.
 anyone [Chelswu-NOM Minci-ACC like-PRS-DCL-CMP] spread.rumor-NEG-PST-DCL
 ‘Nobody spread a rumor that Chelswu likes Minci.’
- (16) *Amwuto* [*Huyyengi-ka Cwuyeni-lul koylophy-ess-ta-ko*] *ssuci-anh-ass-ta*.
 anyone [Huyyengi-NOM Cwuyeni-ACC bully-PST-DCL-CMP] write-NEG-PST-DCL
 ‘Nobody wrote that Huyyeng bullied Cwuyen.’
- (17) *Amwuto* [*Hwaswu-ka khemphyuthe-lul hwumchy-ess-ta-ko*] *hwaksinhaci-anh-ass-ta*.
 anyone [Hwaswu-NOM khemphyuthe-ACC like-PST-DCL-CMP] sure-NEG-PST-DCL
 ‘Nobody was sure that Hwaswu stole a computer.’

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