

The Interpretation of English Sentences Containing Quantification and Negation by L1-Korean L2-English Adult Learners

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1. Introduction

The contrast between the invariable success of first language (L1) acquisition and the different degrees of success in adult second language (L2) acquisition has been at the center of numerous L2 studies. Many researchers have examined the question of whether the variable outcomes of L2 acquisition stem from the same or different process from that of L1 acquisition. That is, how much of adult L2 acquisition can be explained by innate linguistic mechanisms that constrain L1 acquisition? While some researchers view L2 acquisition to be fundamentally different from L1 acquisition in that it primarily relies on general learning strategies than innate linguistic mechanisms that are constrained by Universal Grammar (UG) (Meisel, 1997; Bley-Vroman, 1989 among others), others on the opposite side of the spectrum support the Full Transfer/Full Access (FT/FA) proposal that claims that the L1 grammar initially fully transfers to the L2, and UG is also fully available in L2 acquisition (Schwartz & Sprouse, 1994, 1997).

Various linguistic phenomena have been examined under such proposals, and recent developments have continued this line of inquiry in interface domains that have proved particularly problematic in L2 acquisition. Competence vs. performance discrepancies in which L2 learners exhibit difficulty despite possessing native-like grammatical representations and constraints were found to be especially present in the L2 acquisition of interface conditions—the syntax-and-semantics interface as well as the interface between pragmatics and grammatical knowledge (Montrul and Slabakova, 2002; Slabakova, 2007). In their study of aspectual shifts in L2 Spanish by L1-English learners, Montrul and Slabakova (2002) found that certain pragmatic processes are not successfully acquired by high-level advanced L2 speakers who have acquired all grammatical features. Although not specifically set out to test the interface vulnerability hypothesis, the results of this study lend support to the interface vulnerability proposal that views interface conditions to be especially vulnerable to L2 indeterminacy (Sorace and Keller, 2005). The present study seeks to address the issue of this vulnerability in L2 acquisition by examining a linguistic phenomenon occurring in interface conditions.

The present study examines L1-Korean L2-English adult learners' acquisition of a quantificational phenomena that involve the interplay of multiple levels of linguistic analysis (i.e., syntactic, semantic, and pragmatic) in L2 acquisition that has yet to be examined. Notable differences in scope availability and configurations between English and Korean would predict difficulty for the Korean L2 learners in their interpretation and acceptance of scope readings in English. However, would adult L2 learners of English be facilitated by “mature” pragmatic skills in accessing native-like interpretations? If they do exhibit difficulty, would it be a UG-driven developmental problem that can be overcome with increasing proficiency? By looking at a linguistic phenomenon that involves the interplay of multiple levels of linguistic analysis in L2 acquisition, this study seeks to shed light on the effects of L1 transfer in interface conditions and provide implications for UG-access.

2. Background

2.1. Some aspects of quantification in English

Quantificational expressions like *every*, *some*, *all*, and *two* are well known to interact with one another and negation to create scope ambiguity (Horn, 1989; Jackendoff, 1972). Various factors such as the lexical nature of the quantificational element (universal (*all*), numeral (*one*, *a*, *two*), indefinite (*some*) etc.) and the syntactic position of the quantified expression (subject vs. object position) contribute to how the quantified expressions interact with negation. In this paper, the interaction between negation and the universal (referring to *all* instances of the given type) quantifier phrase (QP) ‘*every*’ in subject and object positions was the linguistic phenomenon of interest.

2.1.1. Surface Scope vs. Inverse Scope Readings

A sentence with a universally quantified noun phrase (QNP) in the subject position and negation as in statements like *Every horse didn’t jump over the fence* can have two interpretations (Musolino, 1998; Musolino, Crain and Thornton, 2000):

- (1) **Every** horse didn’t jump over the fence.
- a. $\forall x [\text{horse}(x) \rightarrow \neg \text{jump over the fence}(x)]$
 - b. $\neg \forall x [\text{horse}(x) \rightarrow \text{jump over the fence}(x)]$

The universally quantifier subject *every horse* can be interpreted outside of the scope of negation (*every* > *not*) as in (1a), which can be paraphrased as *Every horse is such that it did not jump over the fence* (i.e., *none*). This is called the **surface scope** reading, for the phrase *every horse* c-commands negation, and the interpretation is a direct reflection of the isomorphic mapping between the surface syntactic structure and the semantic structure. On another reading, *every horse* is interpreted within the scope of negation (*not* > *every*) as in (1b) resulting in the interpretation that *Not every horse jumped over the fence* (i.e., *not all*). This is the **inverse scope** reading in which the phenomenon of ‘covert displacement’ takes place with negation interpreted in a position different from the one in which it occurs. Thus, there is a mismatch between the surface syntactic structure and the semantic structure.

2.1.2. Scalar Implicatures: Universally Quantified NP in Object Position

As pointed out by Musolino (2006), one must note that while sentences containing the universally quantified NP in subject position may give rise to scope ambiguity, a sentence may not be perceived as ambiguous if the universally quantified NP is in the object position. The sentence *The professor didn’t talk to every student* is not perceived to be ambiguous as it can be naturally interpreted to mean that the professor talked to some of the students but not all of them (i.e., *not* > *every*) (Musolino, 2006). However, the opposite interpretation may also be true where the professor did not speak to any of the students (*every* > *not*, i.e., ‘none’) because there is an entailment pattern where the ‘none’ interpretation entails the ‘not all’ interpretation. If none of the students talked to the professor, it follows that not all students talked to the professor but not vice versa as shown in (2). Likewise, *all the students talked to the professor* would entail that *some students talked to the professor*, but not vice-versa. Such entailment patterns are a central characteristic of a class of conversational inferences called **scalar implicatures**.

- (2) $\forall x[\neg P(x)] \rightarrow \neg [\forall x [P(x)]]$ none \rightarrow not all
 $\neg \forall x[P(x)] \rightarrow \# [\forall x [\neg P(x)]]$ not all \rightarrow # none

According to Grice’s conversational maxims (Grice, 1957, 1989), a speaker would try to be cooperative and make his/her contribution to the conversation as maximally informative and relevant to the exchange as s/he can. Thus, when the speaker uses a weaker term such as *some*, the listener will assume that the speaker does not mean to offer the informationally stronger statement that can be interpreted as *all*. For example, in sentences like *The professor didn’t talk to every student*, listeners will assume the ‘not all’ reading, for the available stronger statement such as *The professor talked to none of the students* is not used. Therefore, there is a discrepancy between semantics and pragmatics,

as a sentence can be semantically ambiguous with both ‘none’ and a ‘not all’ reading but is pragmatically unambiguous with only the ‘not all’ reading¹.

The above-mentioned characteristics of the linguistic phenomenon in question can be described as involving an interplay of the following three factors: 1) syntactic knowledge of calculating scope relations between the quantifier and negation based on c-command relations and covert displacement, 2) semantic knowledge of the truth conditions based on entailment relations between different interpretations, and 3) pragmatic knowledge of deriving certain conversational inferences. As it is, the interpretation of quantification in the scope of negation seems to be a phenomenon occurring at the **syntax-pragmatic-semantics interface**, and the question of interest in the present study is how this interface phenomenon is acquired in L2 acquisition.

2.2. How it works in Korean

Since this study examines L1 speakers of Korean, it is important to review how scope interactions between negation and quantified arguments are achieved in Korean. Unlike the predictable patterns of interpretations found in the English L1 literature, the data in the Korean L1 literature shows little consistency. The judgments are often in conflict with each other, especially in the availability of the reading where negation has wide scope.

Before discussing the conflicting claims in the literature, one must note that negation can be formed in two distinct ways in Korean—short form negation (SFN) and long form negation (LFN). While the negative morpheme *an* is placed immediately before the verb in the SFN, the negative morpheme *an/i* follows the verb which appears with a nominalizer, suffix *-ci*, in the LFN. The form of the negative morpheme *anh-* in LFN is a contraction of the more literary *ani ha-*, which involves the dummy verb *ha-* ‘do’². The surface forms of both pre-verbal and post-verbal negation can be simplified as below:

- (3) SFN: Subject + Object + Quantifier- CL + *an* (neg) V-tense-decl
 LFN: Subject + Object + Quantifier-CL + V-*ci ani* (neg) *-ha* -tense-decl.

Unlike in English, the object always precedes negation in Korean due to the SOV word order, which results in differences in surface vs. inverse scope configurations between the two languages: While English exhibits variable scope configurations depending on the position of the quantifier (object vs. subject), Korean exhibits the same scope configurations in both object and subject positions.

While most works in the Korean L1 literature agree that both subject and object QPs can take surface scope reading in both types of negation, the availability of the inverse scope reading is still in much debate, which leads Han, Lidz, and Musolino (2007) to conclude that there are two competing grammars in Korean: one with V-raising and one without³. There is conflicting data particularly in the availability of the inverse scope reading in sentences with SFN with the universal QP ‘every’ (*motun*) in object and subject position (Hagstrom, 2000; Baek, 1998; Kim, 2000; Suh, 1989). While only SFN may disallow inverse scope reading when the QP is in object position, both SFN and LFN may

¹ However, Gualmini (2008) points out that Musolino does not discuss why scalar implicature is not active when *every* is in the subject position, which is a problem for the analysis.

² Various claims have been made regarding the differences in the syntactic structure of the two forms of negation, which does not need to be discussed for the present purposes of the paper. A cursory look at English negation suggests that although there is no exact one-to-one correspondence of the two forms of negation, there are two forms of negation where the surface order of the verb and the negative morpheme are reversed as in the case of Korean. The two forms of negation in English may look similar to those of Korean in their surface order: 1) V-to-I movement in a restricted set of verbs, *be* and *have*, where the verb precedes the negative morpheme as in the surface order of LFN in Korean (e.g., *have not...*, *is not...*) and 2) affix-hopping (do-support) in other verbs where the negative morpheme precedes the verb as in the surface order of SFN in Korean (e.g., *does not V*). The English sentences that are of interest in this study are more similar to the latter and SFN.

³ V-raising is hard to detect in a head-final language like Korean, for simple SOV strings do not differentiate between a structure in which the verb occupies V or is raised to I(nflection). Claims have been made in both directions, and Han, Lidz, and Musolino (2007) argue that scope interpretation with negation and a quantified object NP could provide evidence regarding the height of the verb because Korean has a cliticlike negation that associates with the verb in syntax.

disallow inverse scope reading when the QP is in subject position. The conflicting data in the Korean L1 literature regarding the *availability* of the inverse scope reading when the QP is in subject position departs from the clear-cut patterns that can be seen in the L1 English literature in which both surface and inverse scope readings are available. On the other hand, when the QP is in object position, the inverse scope reading, which is ruled out by scalar implicature in English, is available in Korean. The availability of scope readings in Korean can be summarized as below:

Table 1: Scope Availability in Korean

	LFN	SFN
Subject QP	<i>Motun</i> > Neg (O) Neg > <i>Motun</i> (X)	<i>Motun</i> > Neg (O) Neg > <i>Motun</i> (X)
Object QP	<i>Motun</i> > Neg (O) Neg > <i>Motun</i> (O)	<i>Motun</i> > Neg (O) Neg > <i>Motun</i> (O)

Assuming that negation and quantifier scope is determined by the same scope principles that govern two quantifiers as put forth by Aoun and Li (1993), we can speculate that the difference in scope availability between the two languages reflects the presence or absence of the Isomorphic Principle in the language. Aoun and Li posit that this scope principle applies to Chinese and Korean but not English. The Isomorphic Principle is restated in (4) below:

(4) The Isomorphic Principle

Suppose A and B are QPs. Then if A c-commands B at S-structure, A c-commands B at LF.

This principle correctly predicts that all scope readings are possible except when negation has wide scope over subject QP in Korean. English, on the other hand, does not follow the Isomorphic principle and allows the negation wide scope reading. It can be said then that the presence or absence of the Isomorphic principle determines scope availability in the two languages when reading sentences with subject QP and negation, and Korean learners of English need to ‘unlearn’ this principle in order to acquire appropriate scope readings in English. Moreover, there are no pragmatic factors at play in sentences with object QP and negation in Korean, which must be learned in L2 acquisition of English.

2.3. Previous Studies

Although not much is known about how second language learners deal with scope ambiguities when interpreting sentences with quantifier and negation, several L2 studies have investigated quantifier scope ambiguities in sentences with *Wh*-QP questions and doubly quantified sentences. In a pilot study, Dellicarpini (2003) tested 60 adult L2 English learners from six different L1s and two proficiency levels (low & high based on SPEAK scores) on a picture identification task and a story task that examined their interpretation of sentences containing the universal quantifier ‘every’. The study found two types of errors: 1) symmetry responses that can also be found in the responses of L1 children and 2) Existential Wide Scope (EWS) responses where the indefinite is given a specific reading. Adult ESL learners’ misinterpretation was found to mirror that of L1-learning children, and quantification was concluded to be a universally constrained aspect of language acquisition. The overall data supported the view that the problem in the semantic acquisition of quantification is linguistic in nature that reflects UG-guided learning. Dellicarpini also addressed the role of L1 transfer briefly as EWS errors were found to be particularly common for L1-Chinese/Korean/Japanese speakers whose L1 treats quantification differently from English when compared to languages like Spanish. That is, the difference in performance among different L1 groups was seen to be partially attributable to L1 transfer.

In addition, Lee, Yip, and Wang (1999) investigated quantifier scope interpretation in L1 Chinese-L2 English interlanguage with intermediate and advanced Chinese learners of English. The L2 learners’ performance was comparable to that of the native speakers of English in their rates of acceptance of inverse scope, and they also showed native-like sensitivity to the influence of thematic role and the lexical properties of quantifier type in assigning inverse scope. The lack of an L1 transfer effect in this study suggests that the Chinese L2 learners’ acquisition of the inverse scope interpretation in English may occur at an earlier stage of acquisition, before the learners reach the

intermediate level. Similar results were reported by Miyamoto & Takata (1998) and Miyamoto & Yamane (1996) who investigated the interpretation of English *wh*-QP questions by Japanese L2 learners of English by using a truth value judgment task. While the intermediate/advanced learners were almost native-like in their responses of scope interpretation in *wh*-QP questions, *wh*-movements, and Scope Principle, those with lower proficiency showed a tendency of disallowing pair-list readings of *wh*-QP questions. This provides evidence for the theory that *wh*-movement may be nonexistent in the early stages of L2 acquisition in the interlanguages of learners whose L1 does not have an overt *wh*-movement.

Furthermore, Marsden (2004) investigated the interpretation of quantifier scope in L2-Japanese by three different L1 groups—Chinese, Korean, and English. By observing crosslinguistic differences in the scope interactions of QP-QP (existential universal: QP_{subj}...QP_{obj}...or QP_{obj}... QP_{subj} if scrambling is allowed. e.g., *Someone criticized everyone*) and *Wh*-QP (e.g., *Who did everyone invite?*) structures⁴, the study addressed the poverty-of-the-stimulus (PoS) effects as well as the role of L1 knowledge. In this very extensive but well-controlled study, the three different L1 speakers faced different POS problems: L1-English speakers need to “unlearn” inverse scope with both QP-QP and *Wh*-QP interactions, L1-Chinese speakers need to “unlearn” inverse scope with *Wh*-QP interactions, and L1-Korean speakers do not face any problems as the phenomenon in question in their L1 is very similar to that of Japanese⁵. The three groups of subjects were tested on two acceptability judgment tasks: In the QP-QP study, L1 transfer influenced intermediate L1-English speakers, but UG-access was evident for advanced L1-English speakers. In the *Wh*-QP study, L1 transfer effects were evident in all groups as they accepted pair-list readings, but with increased proficiency started preferring individual readings although they were not quite native-like yet. Thus, the results were found to confirm the hypotheses that L2 acquisition can overcome PoS and is indeed guided by UG.

Taken together, previous studies that examine scope interpretation in L2 acquisition all strongly implicate UG-access and UG-driven developmental patterns in L2 acquisition indicating that quantification is indeed a universally constrained aspect of language acquisition. Moreover, evidence of L1 transfer has been found especially in L2 learners of low proficiency. Extending the previous findings that have focused on quantifier scope ambiguities, scope interaction between quantification and negation was further examined in the present study.

3. Goal of Study and Hypotheses

By examining L1-Korean L2-English adult learners’ interpretation of the universal QP *every* in the scope of negation in English, this study investigated the patterns of L2 acquisition of a linguistic phenomenon that takes place at multiple interface conditions and to observe the effects of UG-access and possibly L1 transfer. The goal of the present study was to provide evidence for indeterminacy in interface conditions that are problematic in both L1 and L2 acquisition, which is nevertheless universally constrained in language acquisition.

The following research questions were examined:

- 1) Do adult L1-Korean L2-English learners transfer their L1 interpretation of sentences containing negation and universal QP to their L2 English counterparts?
- 2) If L1 transfer can be found, can the learners overcome the transfer effects and eventually acquire native-like interpretations of the present phenomenon?

Due to the indeterminacy of the present phenomenon, L2 learners were predicted to exhibit L1 transfer of scope acceptance as summarized in Table 2.

⁴ It must be noted, however, that QP-QP and *Wh*-QP interactions are separate phenomena that are significantly different from QP-Neg interaction and therefore performance on these phenomena should not be conflated.

⁵ However, Marsden (2004) found L1 Chinese and L1 Korean control subjects behaving contrary to the claims in the literature especially in the *Wh*-QP interactions in which L1-Chinese accepted only pair-list responses and L1-Korean accepted both types of responses (cf. L1-Japanese accepted only individual responses). Based on this new evidence, the hypotheses were revised so that all three groups of learners need to “unlearn” the pair-list reading which is a PoS problem.

Table 2: Predictions

	L1 Adults	L2 Adults
Subject QP	Both	Surface (Every > Not)
Object QP	Surface (Not > Every)	Both ⁶

Notwithstanding the indeterminate nature of the phenomenon and the effects of L1 transfer, the L2 learners of different proficiencies were expected to exhibit a developmental pattern with advanced learners exhibiting greater accuracy in native-like interpretations as have been found in previous studies examining scope interaction. In other words, this study expected to find evidence for UG-driven developmental patterns in L2 acquisition of the linguistic phenomenon in question.

4. Method

4.1. Participants

In this study, the control group consisted of 15 native-speakers of English (ages 18-30) who were attending UIUC as undergraduate or graduate students. The experimental group consisted of 38 adult Korean L2-learners of English (ages 18-36): 25 learners recruited in the US were undergraduate or graduate students at UIUC or students learning English at the Intensive Language Institute (IEI) at UIUC, and 13 learners recruited in Korea were either students or recent college graduates. All L2 learners indicated in the language background questionnaire that they started learning English at around ages 12-13 in an EFL setting (i.e., in Korea), and none of the participants recruited in the US arrived to the US before the age of 18. The L2 learners' proficiency level was measured using a cloze test, and they were divided into three proficiency groups using K-Means Cluster on SPSS with the test score (out of 40) as a variable: 12 learners with advanced proficiency (Adv: 34-38), 14 learners with high-intermediate proficiency (H-Int: 30-33), and 12 learners with low-intermediate proficiency (L-Int: 17-29).

4.2. Test Instrument

The present study used an **Acceptability Rating Task⁷ (ART)**, in which the subjects were asked to read 48 short passages and rate the acceptability of a target sentence following each passage on a scale of 4 (1: Unacceptable, 4: Acceptable). The ratings on acceptability did not concern the grammaticality of the sentence but the overall meaning. That is, the participants were asked to decide whether the sentence is "an acceptable description in the context of the story". The short passages were accompanied by pictures that were designed to help the participants' comprehension of the passage. If the participants gave a rating of 1 or 2 ("unacceptable" or "not very acceptable"), they were asked to rewrite the target sentence into a more acceptable form. The ART was a 2 x 2 design that consisted of four different types of sentences crossing in two variables: 1) the position of *every* (subject and object) and 2) the scope assignment context of short stories/passages (surface vs. inverse scope). All four categories had six items each, and an equal number of fillers (24 items) that are similar in format were included. The fillers were inserted after each test item so as not to prime the subjects towards a particular reading. The test design is as follows in Table 3:

Table 3. ART Test Design

	Surface scope	Inverse scope
Subject position of QP <i>e.g., Every horse didn't jump over the fence</i>	SS every > not (i.e. none)	SI not > every (i.e. some)

⁶ While both surface and inverse scope readings may be available, Han, Lidz and Musolino (2007) found predominant preference for the *every* > Neg reading.

⁷ I call this task an Acceptability Rating Task (ART) instead of the commonly accepted term Acceptability Judgment Task (AJT) in order to differentiate the two from each other: While AJT is commonly used for judgments on the grammaticality of target sentences, the present design concerns itself more with the interpretation of sentences by asking whether a target sentence is "an acceptable description in the context of the story".

Object position of QP <i>e.g., Mary didn't eat every meal</i>	OS not > every (i.e., some)	OI every > not (i.e., none)
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Sentence types SS and SI examined whether participants can access the surface scope and inverse scope reading respectively when the universal quantifier *every* is in subject position as can be seen in examples (5) and (6).

(5) **SS: Subject position & Surface scope context**

One day, three horses wanted to practice jumping over a fence. The first horse tried to jump but fell. The second horse also tried but the fence was too high. The third one, who saw the other two fall, did not jump.

Every horse didn't jump over the fence

Q: How well does the sentence describe the story?

1	2	3	4
Unacceptable	Not very acceptable	Somewhat acceptable	Acceptable

If 1 or 2, how would you change the sentence? _____

(6) **SI: Subject position & Inverse scope context**

One day, three horses wanted to practice jumping over a fence. The first two horses jumped over the fence but the third one, who had hurt its leg the day before, could not jump.

Every horse didn't jump over the fence

1	2	3	4
Unacceptable	Not very acceptable	Somewhat acceptable	Acceptable

If 1 or 2, how would you change the sentence? _____

While (5) provides a context of surface scope reading in which all three horses do not jump over the fence (every > not), (6) provides that of the inverse scope reading where only some but not all of the horses jump over the fence (not > every). In SS, both control and L2 groups were predicted to accept the target sentence as an acceptable description of the passage, thus accessing the surface scope reading. However, difference in behavior was predicted for SI: The control group was predicted to access the inverse scope reading and accept the target sentence, while the L2 groups would find it difficult to access the inverse scope reading and thus reject the sentence as unacceptable.

Sentence types OS and OI tried to measure the participants' sensitivity to pragmatic bias that is said to be present in sentences containing negation and the universal QP in object position. If participants are sensitive to this pragmatic bias, they will accept (7), but reject (8) below.

(7) **OS: Object position & Surface scope context**

Mary woke up late and missed breakfast. She was busy studying for an exam and forgot to eat her lunch. When she came home for dinner, she ate everything she could find at home.

Mary didn't eat every meal

1	2	3	4
Unacceptable	Not very acceptable	Somewhat acceptable	Acceptable

If 1 or 2, how would you change the sentence? _____

(8) **OI: Object position & Inverse scope context**

Mary woke up late and missed breakfast. She was busy studying for an exam and forgot to eat her lunch. When she came home for dinner, there was no food at home so she went to bed hungry.

Mary didn't eat every meal

1	2	3	4
Unacceptable	Not very acceptable	Somewhat acceptable	Acceptable

If 1 or 2, how would you change the sentence? _____

For OS, the control group was predicted to majorly accept the target sentence while the L2 learner groups were predicted to show a more variable behavior due to the effects of L1 transfer of Korean scope configurations and acceptance. Native controls would show greater sensitivity to pragmatic bias and judge sentences like *Mary didn't finish every meal* to be acceptable descriptions of contexts in which Mary ate only one out of three meals, while L2 learners would lean towards the reading that Mary did not eat *any* meal⁸. The opposite was predicted for OI: the control group would reject and the L2 group would accept the target sentence due to the same reasons above⁹. However, the proficiency level of the L2 learners would have an important effect on the learners' performance in all four sentences types with advanced L2 learners accessing native-like scope interpretation to a greater degree than those with lower proficiency.

All the test and filler items of the two tasks were randomized using blocking and only one script was used for all subjects. The minimal pairs (SS vs. SI and OS vs. OI) illustrated similar stories differentiating only in minor detail such as the names of people so as to ensure a fair comparison between the contexts for surface vs. inverse scope readings.

4.3. Procedure

The participants were first asked to fill out a language background questionnaire in which they provided information about their language use, the onset of L2 learning, and self-ratings of their proficiency in English. After measuring the learners' proficiency using a cloze test, the subjects participated in the Acceptability Rating Task. The whole procedure could be completed in one visit (approximately 20 minutes for native speakers and 45 minutes for L2 speakers) in the format of a paper-and-pencil test. Specific instructions as well as sample questions and answers were given on the tests, and the experimenter went over the instructions with the subjects.

5. Results

5.1. Acceptability Rating Task (ART)

5.1.1. Group Results

The predictions for the native control group did not match the results of the study. It was predicted that the native speakers would consistently accept all sentence types except for OI, but the results show that they had a tendency to accept sentences in the surface scope contexts (SS: 3.33, OS: 3.43) but reject those in the inverse scope (SI: 2.33, OI: 2.53). The differences in the mean scores as well as the standard deviation values across the four different groups (NS, L2 Advanced, L2 High-Intermediate, and L2 Low-Intermediate) are calculated in Table 4. The mean scores are also represented in Figure 1 below:

Table 4. Mean scores and standard deviation of sentence types across four groups

	SS	SI	OS	OI
NS	3.33 (.6)	2.33 (.92)	3.43 (.48)	2.53 (.8)
L2Adv	2.41 (.85)	2.77 (.94)	2.93 (.68)	1.79 (.74)
L2HInt	3.42 (.63)	1.83 (.86)	2.06 (.85)	3.31 (.89)
L2LInt	3.47 (.35)	1.5 (.46)	1.77 (.78)	3.52 (.51)

⁸ See footnote 6.

⁹ It must be pointed out that the inverse scope reading entails the surface scope reading (i.e., none → not all), and thus subjects may rate the OI sentences as acceptable because they assign the surface reading.

Figure 1: Mean scores across groups

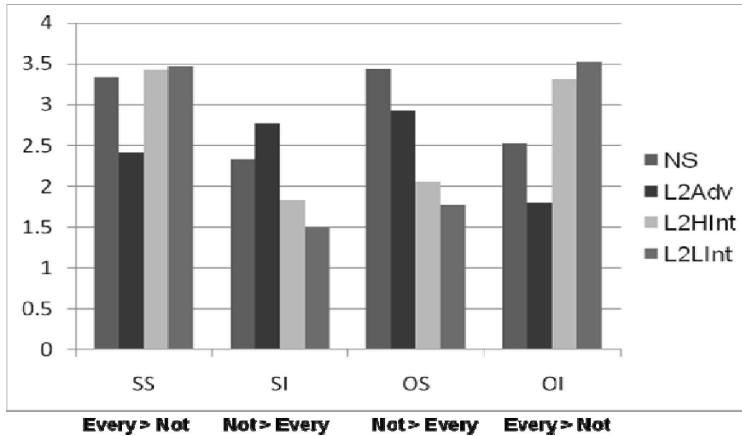
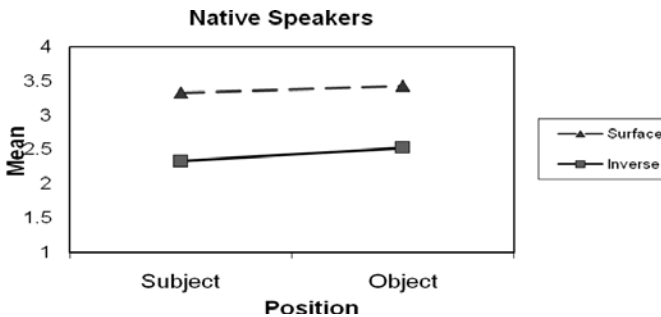


Figure 1 shows that the two L2 intermediate proficiency groups (H-Int and L-Int) patterned alike in their response to all four sentence types, while the advanced group behaved differently from all other groups. As predicted of the L2 learners in this study, the two intermediate groups had a tendency to accept SS and OI (SS: 3.42 and 3.47, OI: 3.31 and 3.51, H-Int and L-Int respectively) and reject SI and OS (SI: 1.83 and 1.5, OS: 2.06 and 1.77, H-Int and L-Int respectively). The advanced group, on the other hand, showed a more ambivalent behavior in most sentence types (SS: 2.41, SI: 2.77, and OS: 2.93) but frequently rejected OI (1.79) in contrast to the other L2 groups. The standard deviation of mean scores across the four groups in Table 4 indicates that even the NS group exhibited much variation in their ratings of all sentence types. This suggests that the phenomenon at hand is ambiguous even for native speakers, and that the present study may not be testing the *availability* of the interpretations in question but instead be testing *preference* of one interpretation over another.

To further understand the observations above, a mixed ANOVA was conducted on SPSS in order to test for effects of group (NS, L2 Adv, L2 H-Int, and L2 L-Int), position (subject and object), and context (surface scope and inverse scope). Group was a between-subjects factor, and position and context were within-subjects factors. There was a significant main effect of context ($F(1, 49) = 24.327, p < .001$, partial eta squared = .332) and group ($F(3, 49) = 4.108, p = .011$, partial eta squared = .201) but no significant effect of position ($F(1, 49) = .308, p = .580$, partial eta squared = .006). The test of within-subjects effects yielded a significant main effect for context and the interaction of context with other variables. There was significant interaction between context and group ($F(3, 49) = 5.9, p = .002$, partial eta squared = .265), position and context ($F(1, 49) = 19.031, p < .001$, partial eta squared = .280), and position, context, and group ($F(3, 49) = 15.891, p < .001$, partial eta squared = .493). These effects can be better understood by looking at profile plots in Figures 2 ~5 below that illustrate the interaction between position and context by each group:

Figure 2: Interaction of position and context by NS



The plot in Figure 2 shows that the NS group was much more willing to accept the surface scope context than the inverse scope when the QP is in both subject and object positions. Contrary to the findings of previous studies and predictions of the present study, the NS group's behavior followed

what was predicted of L2 learners when interpreting sentences with QP in subject position. On the other hand, the NS group behaved as was predicted when QP is in object position showing a tendency to accept OS and reject OI in accordance with the pragmatic bias of scalar implicature.

Figure 3: Interaction of position and context by L2 Advanced

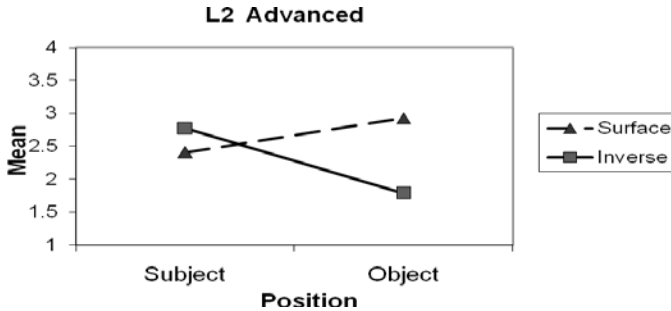


Figure 3 shows that the L2 advanced group was more ambivalent in their answers than the three other groups when the QP is in subject position. However, when the QP is in object position, the advanced group behaved native-like showing a tendency to reject the inverse scope context while accepting the surface scope. Such results indicate that the advanced learners could access both surface and inverse scope readings almost equally when interpreting sentences with subject QPs and are also sensitive to the pragmatic bias of scalar implicature like native speakers when interpreting sentences with object QPs.

Figure 4: Interaction of position and context by L2 High-Intermediate

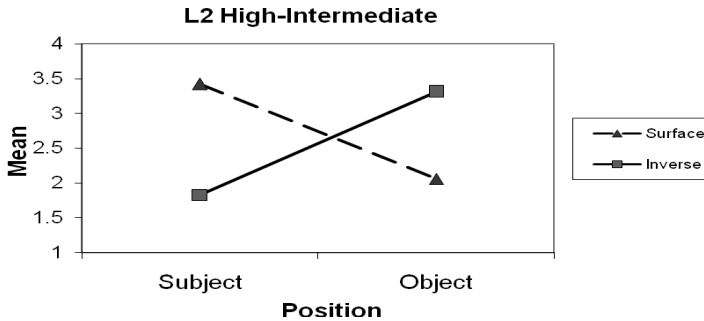
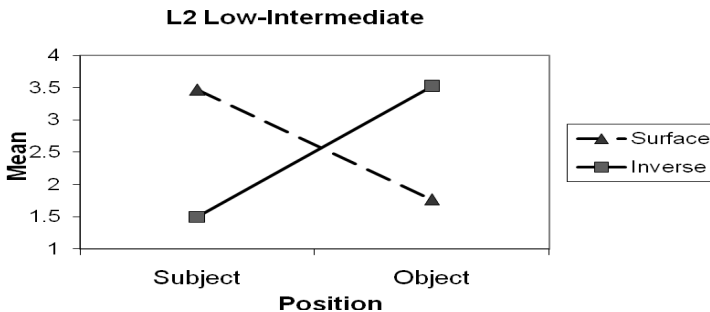


Figure 5: Interaction of position and context by L2 Low-Intermediate



According to Figures 4 and 5, both intermediate proficiency groups were more willing to accept the surface scope context than the inverse scope when the QP is in subject position similar to what has

been observed for the NS group. On the other hand, the inverse scope context was more frequently accepted than its surface scope counterpart when the QP is in object position unlike the pattern exhibited by NS and L2 Adv groups. Such results matched the predictions made about L2 learners with lower proficiency: Lower-level L2 learners were more likely to accept the surface scope reading for QPs in subject position and were insensitive to the pragmatic bias for sentences with QPs in object position possibly due to L1 transfer of different scope configurations and availability. In sum, the effects of context on group and position illustrated in the interaction graphs show that while the two L2 intermediate proficiency groups patterned alike in their interpretations, the L2 advanced group and the NS group each exhibited a distinctive pattern of interpretation that is different from the lower proficiency learners as well as to each other.

6. Discussion

This study examined L1-Korean L2-English adult learners' interpretation of sentences containing quantification and negation in English in order to explore the patterns of L2 acquisition of a linguistic phenomenon that takes place at multiple interface conditions and to observe the effects of UG-access and possibly L1 transfer. While it was predicted that the NS control group will behave fairly consistently across all sentence types, there was a lot of variation even for the native speakers, which indicates that the test instrument used in the study might not be testing the *availability* of a particular interpretation but the *preference* of one interpretation over another. As it is, one of the drawbacks of an offline written test is that the participants' final response may not reflect their initial intuitive judgment. The participants often crossed out and changed their corrections of unacceptable target sentences, indicating that the participants "mulled over" their answers despite being asked to answer intuitively. Previous studies that have examined the phenomenon in question with L1 learners were oral in format and exhibited quite a different pattern of results for adult English native speakers. Thus, it can be speculated that the written format of the task had a significant effect on the results of the study.

The initial hypothesis that the native speakers would be willing to accept both surface and inverse scope contexts when *every* is in subject position was not manifested in the results of the study, as they showed a tendency to reject the inverse scope interpretation. However, it can be speculated that while L1 adults were able to access the inverse scope reading, their responses reflect their *preference* for the surface scope reading. In sentences with *every* in object position, the hypothesis about L1 adults' sensitivity to pragmatic bias derived by scalar implicatures was manifested in the results.

The results of the L2 groups indicate that the learners' proficiency level plays an important role in the patterns of scope interpretations, as learners of different proficiencies exhibited different behaviors. The advanced learners seemed to access both surface and inverse scope readings with no clear preference for either one when the QP is in subject position and patterned like the native speakers when the QP is in object position. In other words, the advanced learners were almost native-like in their patterns of scope interpretation aside from a lack of clear preference of the surface reading in SS and SI. On the other hand, learners of lower proficiency levels performed as what has been predicted: They showed a clear preference for the surface scope reading in SS and SI and were not sensitive to the pragmatic bias in OS and OI. While it is hard to tease apart whether a participant's interpretation is the result of the availability of or his/her preference for a particular scope reading, it can be speculated that the lower proficiency L2 learners' selection of the surface scope reading in SI and SN reflects the availability of and not necessarily their preference for that reading. That is, these learners may find the inverse scope reading harder to access and thus select the surface scope over the inverse scope unlike the L1 adults who *prefer* the surface scope reading despite having access to both. While this sounds plausible, future studies with a different test design will have to confirm these speculations.

The lower proficiency learners' performance can be explained by L1 transfer. Rather than drawing on the interaction between syntax, semantics, and pragmatics in English when interpreting the target sentences, the learners could be translating the sentences into their Korean equivalents. However, the significantly different behavior of advanced learners implicates that the linguistic phenomenon in question could indeed be driven by UG developmental patterns. The advanced learners show sensitivity to the pragmatic bias in OS and OI contexts like the native speakers, but are more variable and ambivalent in their acceptance of scope interpretations in SS and SI than both the intermediate proficiency learners and the native speakers. Such behavior indicates a growing sensitivity to pragmatic bias as well as the availability of both scope readings that are derived from the interaction

between syntax and semantics. It can be assumed that while the advanced learners can access both scope readings with relative ease, they have not yet developed a clear preference for a particular reading, in contrast to the native controls who exhibit a clear preference for the surface scope reading.

The overall results suggest that L2 learners can be interfered by L1 transfer in the beginning to intermediate stages of acquisition but can overcome the transfer effects at a more advanced stage of acquisition. The results of the present study support the findings of previous studies that have found evidence for L1 transfer as well as L2 indeterminacy in interface conditions, which is nevertheless universally constrained in language acquisition.

7. Conclusion

In this paper, we have examined the interpretation of sentences containing quantification and negation in English by L1-Korean L2-English adult learners. As has been found in previous studies, this study has also found evidence for L2 indeterminacy in interface conditions, L1 transfer effects, and UG-driven developmental patterns in L2 acquisition. Although the results may not be conclusive, distinctive patterns of behavior in L2 learners of different proficiencies and the native speakers in the study implicate the relevance of the above three factors in L2 acquisition by adult learners.

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