THE TWO-GRAMMAR MODEL FOR KOREAN AND ITS CONSEQUENCES*

ERICA J. YOON
JUNKO SHIMOYAMA
McGill University

1 Two Grammars in Korean (and Japanese): Low Negation and High Negation

In their influential paper, Han, Lidz and Musolino (2007) propose that Korean has two grammars, one with low negation derived by I-lowering, and the other with high negation derived by V-raising.1 According to their proposal, Korean speakers randomly set parameters either to I-lowering or to V-raising, as the language data that they are exposed to are assumed to be impoverished and therefore compatible with either parameter setting. In Han et al.’s model, for sentences with so-called short or long negation and another scope-bearing element in the object position, the low negation grammar only generates the scope in (1), while the high negation grammar only generates the scope in (2).2 Thus, for the sentences in (3) and (4), speakers of the low negation grammar are expected to only obtain the every>not reading in (5), and speakers of the high negation grammar are expected to only obtain the not>every reading in (6) (see also Han, Lidz and Storoshenko forthcoming). For reasons of space, only the structures involving short negation are reproduced in (7) and (8) from Han et al. (pp. 33-5) for illustration.3

---

1 A similar claim is made for Japanese as well in Han (2008) and Han et al. (2004, 2008). Some of the points we raise for Han et al.’s (2007) analysis of Korean carry over to their analysis of Japanese.

2 Short negation occurs preverbally, while long negation occurs postverbally. The latter involves a -ci suffixed main verb and ha-support.

3 A crucial assumption that they make is that the object QP position is fixed as shown in the trees. Reconstruction of QPs or negation is not assumed (see, for example, Kim and Sells 2007 and A.-R. Kim 2002).

---

* We would like to thank the audience and organizers of WAFL 8 at the Universität Stuttgart, McGill syntax-semantics research group, and the students in LING 571 Syntax 2 in Fall 2011 at McGill University, in particular, Alan Bale, Yosef Grodzinsky, Paul Hagstrom, Shin Ishihara, Shin-sook Kim, Junya Nomura, Duygu Özge, and John Whitman. The research reported here has been supported in part by SSHRC (410-2010-1264) and FQRSC (2012-SE-144646), for which we are grateful.
The proposal makes several important predictions. The general goal of this paper is to explore one of them, namely, the prediction that each grammar syntactically generates only one of the two relative scope possibilities between object QP and negation.

2 Unexpected Judgment Patterns and Entailment

It is predicted by Han et al. that half of the Korean-speaking population would accept sentences such as (3) and (4) as true statements only in every>not contexts (where the every>not reading comes out as true), while the other half would accept such sentences as true only in not>every contexts (where the not>every reading comes out as true). Contrary to the prediction, almost all subjects in their experiments using a truth value judgment task (Crain and Thornton 1998) accepted such sentences in every>not contexts. That is, the speakers of the high negation
grammar have access to the low negation reading in (1) Object QP>Neg, even though their syntax only generates the scope in (2) Neg>Object QP. The table in (9) summarizes the mismatch in prediction and experimental results.4

<table>
<thead>
<tr>
<th>(9)</th>
<th>i. predicted</th>
<th>ii. observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. every&gt;not reading</td>
<td>≈50%</td>
<td>≈100%</td>
</tr>
<tr>
<td>b. not&gt;every reading</td>
<td>≈50%</td>
<td>≈50%</td>
</tr>
</tbody>
</table>

Han et al.’s explanation of this unexpected pattern has to do with the entailment relation found in (5) and (6). ‘Cookie Monster ate no cookie’ (every>not) in (5) entails that ‘it is not the case that Cookie Monster ate every cookie’ (not>every) in (6). In other words, any situation that makes the stronger every>not reading true is a situation that makes the not>every reading true. Thus the speakers of the high negation grammar (though their syntax only generates not>every) also accepts a statement in an every>not context (where an every>not reading is true), because the context is consistent with the weaker reading not>every that their syntax generates. If Cookie Monster ate no cookie, it is not incorrect, logically speaking, to describe the situation by saying that it is not the case that Cookie Monster ate every cookie. Note that the proposed analysis is strictly truth-conditional in that it ignores the role of scalar implicature – that a speaker uttering (6) implicates that (5) is false. The situation is summarized in (10).

<table>
<thead>
<tr>
<th>(10)</th>
<th>low neg grammar</th>
<th>high neg grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. every&gt;not reading</td>
<td>✓</td>
<td>accepted due to entailment</td>
</tr>
<tr>
<td>b. not&gt;every reading</td>
<td>*</td>
<td>✓</td>
</tr>
</tbody>
</table>

3 Removing Entailment

Han et al.’s analysis of the unexpected judgment pattern sketched above makes several important predictions, one of which is that removing entailment should lead to a different judgment pattern. In general, scope ambiguities in Han et al.’s model of Korean grammar are predicted to arise for a non-syntactic reason, namely, due to two readings that are related to each other by entailment. In particular, speakers of the high negation grammar are expected to accept the Object QP>Neg reading in addition to the Neg>Object QP reading only when the former entails the latter, as summarized in (11).

<table>
<thead>
<tr>
<th>(11)</th>
<th>a → b</th>
<th>acceptance</th>
<th>low neg grammar</th>
<th>high neg grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ObjQP &gt; Neg</td>
<td>≈100%</td>
<td>✓</td>
<td>accepted due to entailment</td>
<td></td>
</tr>
<tr>
<td>b. Neg &gt; ObjQP</td>
<td>≈50%</td>
<td>*</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

for example, where Q=every

4 The results in column (ii) of (9) are more or less compatible with judgment patterns reported in previous studies, summarized in Han et al. Namely, while negation tends to be interpreted low in general (putting aside potential differences between cases with short negation vs. long negation), some speakers can obtain high negation readings (see Kim, Han, Lidz and Musolino 2003 for a higher acceptance rate for not>every reading with long negation).

5 The percentage acceptance refers to the proportion of the population that accepts the reading in appropriate contexts out of all the population.
Therefore, if we use sentences whose potential readings are not related to each other by entailment, for instance sentences containing numeral quantifiers, it is predicted that the proportion of the population that accepts the Object QP > Neg reading should drop from about 100% to about 50% as shown in table (12). The examples in (13) and (14) are potentially ambiguous between the readings in (15) and (16). Table (17) shows that the two readings are not related by entailment as we can find scenarios where one reading is true while the other is false, and vice versa. We tested this prediction through a preliminary experiment.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>a. ObjQP &gt; Neg</th>
<th>b. Neg &gt; ObjQP</th>
</tr>
</thead>
<tbody>
<tr>
<td>no entailment</td>
<td>acceptance</td>
<td>low neg grammar</td>
</tr>
<tr>
<td>a. ObjQP &gt; Neg</td>
<td>≈50%</td>
<td></td>
</tr>
<tr>
<td>b. Neg &gt; ObjQP</td>
<td>≈50%</td>
<td>*</td>
</tr>
</tbody>
</table>

for example, where Q=numeral

(13) Erica-ga kup-eul se-jan an dwicip-ut-ta. (short negation)
     Erica-NOM cup-ACC 3-CL NEG flip-PST-DECL.
     ‘Erica did not flip three cups.’

(14) Erica-ga kup-eul se-jan dwicip-ci an-at-ta. (long negation)
     Erica-NOM cup-ACC 3-CL flip-CI NEG-PST-DECL
     ‘Erica did not flip three cups.’

(15) There are 3 (or more) cups that Erica did not flip. (3 > neg)
(16) It is not the case that Erica flipped 3 (or more) cups. (neg > 3)

<table>
<thead>
<tr>
<th>(15) 3 &gt; Neg</th>
<th>(16) Neg &gt; 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Erica flips 3 out of 6 cups.</td>
<td>ii. Erica flips 2 out of 4 cups.</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>F</td>
<td>T</td>
</tr>
</tbody>
</table>

---

6 Reversing entailment should also lead to a different judgment pattern than (11), according to Han et al.’s proposal. Though this can in principle be tested by replacing a universal QP with an existential QP as shown in (i), we have not tested the predications as complications arise a) due to the positive polarity nature of muwun-kalnani-ka ‘something’ and b) due to an extra extentence assumption that needs to be added to a scenario.

(i) a ← b acc rate low neg grammar high neg grammar
     a. ObjQP > Neg ≈50% | √ |
     b. Neg > ObjQP ≈100% accepted due to entailment | * |

7 It has come to our attention that Han (2008) and Han et al. (2008) report on an experiment on Japanese where numeral quantifiers were used (in the form of Num-Cl-Gen NP-case). For regular negation, they obtained a result comparable to the results reported in Han et al. (2007) on Korean universal quantifiers. For the so-called wa-negation, their result was somewhat similar to ours in Figure 1 below, which is not predicted in their model. They propose that the high negation grammar speakers can get apparently low negation reading by a choice function strategy. This seems to be an ad hoc solution because, contrary to the general consensus among native speaker researchers that low negation is generally available while high negation is harder (see footnote 4), the pattern comes out as an accident in the proposed solutions relying on a choice function strategy for numerals and entailment relations for universals.

8 An-at-ta ‘NEG-PST-DECL’ is used in our examples, as opposed to ani-hayess-ta, which Han et al. used. The former is assumed to be a phonological contraction of the latter (Hagstrom 1995) and is more conventionally used in modern Korean.
4 Method

4.1 Participants

Participants were 21 (8 males, 13 females) undergraduate students who were bilingual speakers of English and Korean (mean age: 20.71 years). The participation was voluntary.

4.2 Design

There were two factors in the experiment: the first factor was *scope*, which determines what scope reading is true in a given context: object QP taking scope over negation (Object QP>Neg), or Q>Neg for short, versus negation over object QP (Neg>Object QP), or Neg>Q for short. For example, for sentences (13) and (14) above, Q>Neg condition was depicted by a video clip showing a situation in which a girl named Erica flipped three out of six cups, making the 3>Neg reading true but the Neg>3 reading false, as shown in table (17) above.

Each participant went through at least one trial of the Q>Neg condition and one trial of the Neg>Q condition (i.e., scope was a within-subject factor). This is in contrast to the design used by Han et al., in which each participant was only exposed to one type of scope reading, either Q>Neg or Neg>Q, throughout all trials (i.e., scope was a between-subject factor), ‘in order to avoid potential contaminating effects between the two possible readings (p. 27)’. According to Han et al., if a speaker perceived one interpretation (e.g., Q>Neg) of a statement, then it may be difficult for him or her to assign a different interpretation to a similar statement. However, it then also follows that the speaker would tend to consistently accept the interpretation that they first perceived. This implies that the consistency in judgment that Han et al. found in the results they obtained may come from the very source of ‘contaminating effect’ that they tried to avoid. In the current experiment, this problem was avoided by having approximately half of the participants be exposed to the Q>Neg condition first, and the other half to the Neg>Q condition first.

The second factor was *negation*, that is, which type of negation was used in a sentence, with two levels: short negation versus long negation. The sentence ‘Erica did not flip three cups’ may be stated with either short (i.e., (13)) or long negation (i.e., (14)) in Korean. Each subject was exposed to both trials with short negation and those with long negation.

The factors in a test sentence other than short or long negation, such as specific action, object, and numeral quantifier, will be referred to as *sentence content* throughout this paper. For example, in sentences (13) and (14), the sentence content is ‘Erica did not flip 3 cups’ (flip-3). There were four different sentence contents (see Appendix A for a list of sentence contents).

4.3 Stimuli

There were two types of video clips: one showing a particular situation and the other in which a puppet makes a statement about the situation. There were a total of eight situation video clips for test trials and eight situation video clips for filler trials. For each of the four possible sentence contents, there were two situation video clips, each depicting one of the two possible scope readings. For example, for sentences (13) and (14) above, one video clip showed the situation in (18), depicting the Q>Neg condition (i.e., (15)); the other video clip showed the situation in (19), depicting the Neg>Q condition (i.e., (16)) (see Appendix B for descriptions of video stimuli).
There were two types of filler video clips: those that depicted situations that are true regardless of the scope reading accessed by a speaker (e.g., for sentences (13) and (14), a clip showing a girl flipping two out of five cups); and those that depicted situations that are false regardless of the scope reading (e.g., a clip showing a girl flipping three out of five cups).

There were a total of eight statement video clips: for each of the four sentence contents, there was one sentence with short negation and another with long negation. For example, one sentence clip contained a puppet making a statement in Korean: ‘listen and see if what I say is right: Erica did not flip three cups. Is what I said right?’ using the test sentence ‘Erica did not flip three cups’ with short negation (i.e., (13)) or with long negation (i.e., (14)). The test sentence was also provided at the bottom as caption (for the sentence stimuli, refer to Appendix A).

4.4 Procedure

Each participant was tested individually, using the truth value judgment task (TVJT) of the same format as in Han et al.’s study. He or she was shown a video clip that shows a girl performing an action upon certain objects, followed by a sentence clip in which a puppet made a statement. The participant was asked to accept (‘yes’) or refuse (‘no’) the puppet’s statement and indicate on an evaluation sheet that they were given. The participants began with one practice trial, and then went through at least two test trials and two filler trials in a pseudo-random order. Each participant was tested alone with minimal interaction from the researcher during the experiment and was debriefed after each session.

5 Results

For each factor, the dependent measure was the proportion of ‘yes’ responses to the puppet’s statements, as indicated on the evaluation sheet. Figure 1 shows the percentage acceptances for each scope and negation condition, where each percentage depicts proportion of ‘yes’ responses out of all the responses (‘yes’ or ‘no’) taken together. For all scope and negation conditions, the percentage acceptances were near or above 70%.
Data from this preliminary experiment yielded some interesting patterns of results, shown in Figure 2. Figure 2 shows the percentage acceptances for each scope and negation condition, divided by different sentence contents presented in each trial. The Flip-3 condition shows similar trend of results as the overall results across all sentence contents, with percentage acceptances above chance level. The Play-3 condition is interesting in that on average it shows percentage acceptances lower than 50%, except for the condition with the Neg>Q reading with long negation, which shows 100% percentage acceptances. For the Use-2 and Throw-2 conditions, all the percentage acceptances were virtually 100%.
6 Discussion

To reiterate what Han et al. would have predicted for this experiment, participants were expected to be divided into two populations, such that one population would always accept the Object QP>\textit{Neg} reading and reject the \textit{Neg}>Object QP reading, whereas the other population would always accept the \textit{Neg}>Object QP reading and reject the Object QP>\textit{Neg} reading. Assuming that each population has exclusive access to only one grammar, there would not be any overlap in the members of each population. Thus, the two populations should add up to 100% of the entire population of Korean speakers. If each population is equally large, then each population should be represented by 50% in Figure 2. The data obtained from this preliminary experiment, however, does not seem to support this prediction. As shown in Figure 1, percentage acceptances in each condition is near or over 70%. This indicates that there are at least some members who accept both \textit{Q}>\textit{Neg} and \textit{Neg}>\textit{Q} readings, contrary to Han et al.’s proposal that there is no member that has access to both grammars.

Furthermore, the experiment also revealed interesting patterns in data, as shown in Figure 2. Depending on the sentence content in each trial, there seemed to be variability in speakers’ judgments. This result was unexpected as varied sentence contents were only used to reduce any bias speakers might have for a particular sentence. On average, speakers were predicted to respond similarly regardless of the sentence content.

This variability in judgments depending on sentence contents may partially have been caused by the numeral quantifier types used in each sentence, that is, whether numeral quantifier of 2 or 3 was used. For the conditions using the numeral quantifier of 3, the percentage acceptances were near 50%, whereas the conditions using the numeral quantifier of 2 yielded much higher percentage acceptances, near or equal to 100%. Thus, there appears to be some effect of numeral quantifier on speakers’ judgments on sentences, which needs to be taken into consideration for future investigation of the issue.

There are other factors that need to be improved from this preliminary experiment. First, the number of subjects recruited for this experiment, in combination with the number of trials each subject was exposed to, was too low to yield statistical significance. Second, the participants were bilingual, for the reasons of accessibility, as opposed to the participants for Han et al.’s study, who were monolingual (see H.-J. Kim 2007).

Another issue, in the sentence clip stimuli, is that the prosody in voiced reading of sentences could have affected speakers’ judgments (see, for instance, Hirotani 2004 and Ishihara 2007). Voiced reading was for the purpose of making the experiment as similar to Han et al.’s study as possible. However, there has been reported evidence that Korean adults use prosody to determine which interpretation of a sentence was intended (Jun and Oh 2006).

Another factor to be considered is the form of numeral quantifier used in the sentence stimuli. The use of postnominal ‘floating’ quantifiers in the present experiment, instead of prenominal quantifiers used by Han et al., was motivated by the fact that the former is said to be compatible with both interpretations of Object QP>\textit{Neg} and \textit{Neg}>Object QP (Kwak 2010), despite a potential concern about constituency (see Han et al.: 27). More careful considerations are necessary regarding interpretive properties of different forms of numeral quantifiers (see, e.g., Muromatsu 1998; Ochi 2012; Nomura 2012).

---

9 We would like to thank Shin Ishihara and Duygu Özge for comments and pointers on this issue.
10 For comments and discussions on this point, we would like to thank Junya Nomura and John Whitman.
Also, as noted above, the condition with the Play-3 sentence content displayed a puzzling pattern of results, in which subjects performed at a less-than-chance level in three out of four conditions across scope and negation. This may be because this sentence type is special − the equivalent of ‘to play with’ in Korean requires a double verb construction, whereas the three other sentence contents contain a single verb (see Appendix A).

Taking all these issues into consideration, an improved and larger-scale experiment was designed and run in June-August 2012 in Seoul, Korea with monolingual Korean speakers. Analyses of the results obtained are in progress, where we attempt to address the issues identified above, as well as remaining questions for Han et al.’s two-grammar model.

7 Concluding Remarks

While our preliminary study undoubtedly has many limitations that we plan to address in future work, the experimental results reported here suggest that Han et al.’s two-grammar hypothesis requires further investigation. Below we list a couple of other reasons why the two-grammar hypothesis requires further thoughts.

First, as it stands, massive miscommunication is expected among Korean speakers in the current model of Han et al. For example, imagine that speaker A of high negation Korean converses with speaker B of low negation Korean as in (20). Though A’s intended meaning was not>every, B can only interpret A’s utterance as conveying the every>not meaning. One would like to know how such potential miscommunication is avoided.

(20) Speaker \text{A}_{\text{high neg}}: I \text{ did not read every article.} \quad \text{(intended reading: not>every)}
Speaker \text{B}_{\text{low neg}}: I \text{ told you to read at least some!}

Second, Han et al.’s model generates apparent ambiguity despite unambiguous syntax. The high negation grammar speakers thus have two very different routes to accepting statements in the TVJT (see (11)): (i) acceptances in not>every contexts are guaranteed by syntax, and (ii) acceptances in every>not contexts are based on entailment relations and not calculating scalar implicature. It is expected then that these different qualities of acceptances in the TVJT could be experimentally verified.\textsuperscript{11} More specifically, the nature of acceptance of sentence (3) or (4) in every>not contexts by the high negation grammar speakers is predicted to align with the nature of acceptance of the syntactically and semantically unambiguous sentence in (21) in every>not contexts by any speaker of Korean. It is also predicted to align with the nature of acceptance of its English translation in every>not contexts by speakers of English.

(21) Khwukhi Monste-ka motun khwukhi-lul mek-ci-neun an-at-ta
Cookie Monster-NOM every cookie-ACC eat-CI-NEUN NEG-PST-DECL
‘It’s not (the case) that Cookie Monster ate every cookie.’

\textsuperscript{11} This could perhaps be implemented in terms of reaction time, or in terms of different experimental methods (see Chierchia et al. 2001; Papafragou and Musolino 2003; Papafragou and Tantalou 2004; Barner et al. 2010, among others).
Finally, in Han et al.’s model, Korean speakers randomly set parameters either to low negation via I-lowering or to high negation via V-raising, because of the poverty of stimulus, namely that children do not get enough input that involves negation and object QPs where the intended interpretation is clear:

‘Such facts [=scope facts concerning negation and a quantified object DP (ey/js)] are rare, especially in the input to children, …’ (Han et al. 2007:2)
‘If the split in the population derives from the fact that speakers are rarely exposed to sentences involving negation and an object QP in situations that make it clear which interpretation is intended, then we should expect to find roughly the same split in the population from generation to generation, with speakers choosing either V-raising or I-lowering basically at random.’ (Han et al. 2007:35)

It would be worth revisiting the question of whether this is a well-grounded assumption, in view of Gualmini and Schwarz’s (2009) discussions of what could count as positive evidence in the acquisition of semantics.

For example, evidence from dialogues may very well play a role. If sentence (22a) was uttered to a child in a situation where he has eaten only half of what is on the plate, the intended meaning, not>all, seems clear enough. Even if the child contests the parent’s utterance by saying that he has eaten some, indicating that his interpretation of (22a) was all>not, a subsequent dialogue could make it clear what the parent intended by, for example, using an unambiguous paraphrase. A similar story can be told about (22b), if we imagine that the sentence was uttered in the middle of a child’s transporting cushions one by one from the living room to her room.12

Needless to say, further investigation is needed.

(22)  
a. Zenbu tabe-nakat-ta-ra, ookiku nare-nai yo. (Japanese)  
    all eat-not-PAST-if big become-not PRT  
    ‘If you don’t eat (it/them) all, you wouldn’t be able to become big.’

b. Zenbu motte ika-nai-de yo. (Japanese)  
    all hold-go-not-TE PRT  
    ‘Don’t take (them) all away.’

References


12 See Imani 1993, where it is pointed out that a high negation reading is easily obtained in the antecedent of conditionals.


Kim, Meesook, Chung-hye Han, Jeffrey Lidz and Julien Musolino. 2003. Korean-speaking children’s knowledge on the scope interpretation of the universal quantifier and negation. Ms., Sangji University, Simon Fraser University, Northwestern University and Indiana University.


Kwak, Hye-Young. 2010. Scope interpretation in first and second language acquisition: Numeral quantifiers and negation. Doctoral dissertation, University of Hawai‘i at Manoa, Honolulu, HI.
Appendix A: Test Sentence Stimuli by Negation Condition

For sentence content *use-2: Erica did not use 2 crayons*

(23) a. Erica-ga crayon-eul tu-gae an ssu-t-ta
    Erica-NOM crayon-ACC 2-CL NEG use-PST-DECL
    ‘Erica did not use two crayons.’ (short negation)

b. Erica-ga crayon-eul tu-gae ssuci an-at-ta.
    Erica-NOM crayon-ACC 2-CL use NEG-PST-DECL
    ‘Erica did not use two crayons’ (long negation)

For sentence content *throw-2: Erica did not throw 2 flowers*

(24) a. Erica-ga koc-eul tu-songi an tuncu-t-ta
    Erica-NOM flower-ACC2 -CL NEG throw-PST-DECL
    ‘Erica did not throw two flowers.’ (short negation)

b. Erica-ga koc-eul tu-songi tuncici an-at-ta.
    Erica-NOM flower-ACC2-CL throw NEG-PST-DECL
    ‘Erica did not throw two flowers.’ (long negation)

For sentence content *play-3: Erica did not play with 3 stuffed animals*

(25) a. Erica-ga inhyung-eul se-gae gaci-ko an nola-t-ta
    Erica-NOM stuffed animal-ACC 3-CL hold and NEG play-PST-DECL
    ‘Erica did not play with three stuffed animals.’ (short negation)

b. Erica-ga inhyung-eul se-gae gaciko nolji an -at -ta
    Erica-NOM stuffed animal-ACC 3-CL hold and play NEG-PST-DECL
    ‘Erica did not play with three stuffed animals.’ (long negation)

For sentence content *flip-3: Erica did not flip 3 cups*

(26) a. Erica-ga cup-eul se-can an dwuicip-ut-ta.
    Erica-NOM cup-ACC 3-CL neg flip-PST-DECL
    Erica did not flip three cups.’ (short negation)

b. Erica-ga cup-eul se-can dwuicipci an-at-ta.
    Erica-NOM cup-ACC 3-CL flip NEG-PST-DECL
    ‘Erica did not flip three cups.’ (long negation)
Appendix B: Video Stimuli by Sentence Content and Scope Condition

(27) For sentence content use-2: Erica did not use 2 crayons
   a. Q>Neg: There were four crayons. Erica used two.
   b. Neg>Q: There were two crayons. Erica used one.

(28) For sentence content throw-2: Erica did not throw 2 flowers
   a. Q>Neg: There were four flowers. Erica threw two.
   b. Neg>Q: There were two flowers. Erica threw one.

(29) For sentence content play-3: Erica did not play with 3 stuffed animals
   a. Q>Neg: There were six animals. Erica played with three.
   b. Neg>Q: There were four animals. Erica played with two.

(30) For sentence content flip-3: Erica did not flip 3 cups
   a. Q>Neg: There were six cups. Erica flipped three.
   b. Neg>Q: There were four cups. Erica flipped two.