Contrastive focus affects word order in Korean sentence production

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1. Introduction

This paper presents results of a sentence production experiment in Korean that investigated speakers' preferences in word order. Despite the existence of so-called "canonical" order for certain types of sentences, Korean exhibits flexible linear word orders that maintain constant grammatical relations (Sohn, 1999). For example, a dative sentence describing an object transfer can have various word orders above and beyond those described in (1), while (1a) is considered as the canonical order.

(1) a. Subject—Indirect Object (IO)—Direct Object (DO)—Verb.
    b. Subject—DO—IO—Verb.
    c. IO—Subject—DO—Verb.
    d. IO—DO—Subject—Verb.
    Etc.

Given the flexibility permitted in the language along with the existence of the canonical order, we can ask which factors lead native speakers of Korean to produce one word order versus another in the course of online

sentence production. Previous studies using psycholinguistic experiments have identified several factors affecting speakers' word order choices in on-line production. For example, *information status* of the noun phrases matters: people tend to mention given information before new information (e.g., Ferreira and Yoshita, 2003). *Imageability* of the referent also affects word order. Bock and Warren (1985), for example, found that noun phrases with more imageable or concrete referents are mentioned earlier than less imageable referents. *Phrasal length* is also a factor, but its influence is in the opposite direction in English and Korean/Japanese, arguably due to differences in verb placement across these languages (Hawkins, 2004). English speakers tend to mention short phrases before long phrases (e.g., Arnold, Wasow, Losongco, and Ginstrom, 2000; Stallings, MacDonald, and O'Seaghdha,1998), while Korean and Japanese speakers mention long phrases before short phrases (e.g., Dennison, 2008; Yamashita and Chang, 2001).

Another factor that has received much attention is the *animacy* of the referent. Various studies have demonstrated that people prefer to mention animate entities before inanimate entities (e.g., Chang, Kondo, and Yamashita, 2000; Dennison, 2008; Pra-Sala and Branigan, 2000; Branigan, Pickering, and Tanaka, 2008). Dennison (2008), for example, investigated how animacy of the dative argument affects speakers' preference for the canonical order [S–IO–DO–V] in Korean. Materials included sentences like (2), where the direct object (DO) was always inanimate and the indirect object (IO) was either animate (2a) or inanimate (2b).

(2) a. Yengswu-ka   **samchon**-hanthey phica-lul   paytalhaysseyo.
      Yengswu-NOM **uncle**-DAT   pizza-ACC delivered.
      'Yengswu delivered pizza to uncle.'
   b. Yengswu-ka   **yuchiwen**-ey   phica-lul   paytalhaysseyo.
      Yengswu-NOM **kindergarten**-DAT pizza-ACC delivered.
      'Yengswu delivered pizza to kindergarten.'

The results from a sentence production experiment found that speakers produced the canonical order [S–IO–DO–V] 67% of the time when the indirect object was animate. When the indirect object was *in*animate, however, this canonical order preference was significantly reduced to 48%. Instead, people produced an order that switched the order of the internal arguments [S–DO–IO–V] for 44% of the productions, a substantial increase from 27% with the animate IO. These results suggest that the canonical order could be an artifact of a more general preference to mention animate entities before inanimate entities.

Researchers have strived to provide processing-oriented reasons for word order preferences and have argued that this set of factors and their

influences on word order can be captured by the construct of conceptual accessibility: the ease with which the mental representation of some potential referent can be activated in or retrieved from memory (Bock and Warren 1985:50). Consider how this fits with current models of human sentence production.

Levelt (1989) and others have observed that humans produce speech at the impressive rate of three to five words per second. Speakers do so by uttering words and phrases as they become available, instead of waiting for a full sentence to be prepared (e.g., Ferreira, 1996; Ferreira and Dell, 2000). This is because the sentence production system allows incremental processing of the material within a sentence, as well as simultaneous processing across multiple levels of linguistic analysis (see Branigan et al., 2008, for a detailed description).

The accessibility of a concept affects the incremental output of the sentence production system. A concept that is more quickly accessed or activated will have a chance to complete the necessary processing earlier, hence taking higher grammatical relations as well as earlier linear positions (e.g., Branigan et al., 2008; Bock and Warren, 1985; Chang et al., 2000; McDonald, Bock, and Kelly, 1993; Prat-Sala and Branigan, 2000). Therefore, variation in conceptual accessibility can affect sentence word order due to the incremental nature of the sentence production mechanism. More specifically, phrases that present highly accessible material, such as information that is given, imageable, or animate, will tend to occur early in the sentence, because its processing can be completed before that for other phrases.

Given that conceptual attributes are influential in speakers' word order, we investigated the role of another conceptual factor: contrastive focus. Contrastive focus can be seen in Korean sentences employing -*man*, a particle conveying the meaning of 'only' as in (3) below (e.g., Jackson, 2008).

(3) Yumyengin-i yuchiwen-ey-**man** khetalan sikye-lul senmwulhaysse.
celebrity-NOM kindergarten-DAT-**only** big clock-ACC presented.
'A celebrity presented a big clock only to a kindergarten.'

The sentence's surface meaning highlights that a celebrity presented (i.e., gave as a present) a big clock to the focused entity *kindergarten*. However, the sentence also implies that a celebrity did not give a big clock to any other organizations like an elementary school or high school. The unmentioned set of items that is implicitly in contrast with the focused target is called the alternative set.

Recently, many researchers have investigated how contrastive focus is understood in the mind of speakers (e.g., Ito and Speer, 2008; Sedivy, 1997). This work has found that contrastive focus is conceptually rich and that the mental calculation of the alternative set is quite fast (e.g., Rooth,

1992; Sedivy, Tanenhaus, Eberhard, Spivey-Knowlton, and Carlson, 1995). It seems that contrastive focus may increase conceptual saliency. For example, Both Watson, Tanenhaus, and Gunlogson (2008) and Ito and Speer (2008) found faster eye movements in English to the referents of phrases marked with the L+H* pitch accent, which is used to convey contrastive focus. Contrastive focus can be seen as a linguistic device that marks the mentioned information as highly salient while also contrasting it with the alternative set.

If contrastive focus increases conceptual accessibility, we would expect it to influence linear phrasal ordering in Korean sentence production. However, conceptual accessibility is not the only plausible determinate of an effect of contrastive focus on Korean word order. The following sections describe two distinct predictions for the ordering of contrastively focused material. We then present a sentence production experiment that tests these predictions.

2. The current study

The current study tested the effect of contrastive focus on Korean word order production using a phrase-assembly task similar to Dennison (2008) and Yamashita and Chang (2001). We identified two competing hypotheses, drawing from theories of sentence production and syntactic typology.

First, with the *Conceptual Accessibility Hypothesis*, we predicted that a contrastively focused item should tend to be placed on the left periphery of the sentence. This pattern fits with what the current theory of sentence production anticipates: the more salient or accessible a concept is, the earlier it will appear in the sentence, because information is processed in an incremental fashion (e.g., Branigan et al., 2008). The Conceptual Accessibility Hypothesis is consistent with previous findings for the comprehension of Korean sentences, which has shown that phrases which are contrastively focused (and marked by *–man*) are more likely to be interpreted as having been scrambled – that is, moved to an earlier position in the sentence (e.g., Hwang, Schafer, and O'Grady, 2010).

However, other research suggests that a contrastively focused element may tend to appear immediately before the verb. Kim (1988), among others, has argued that the preverbal position is a focus position in Korean as well as in many head final languages. Kim observed that wh-words such as 'who' and 'what', which are considered to be in focus, usually take the preverbal position. If this pattern extends to contrastively focused phrases (versus "regular focus" or "rhematic focus"), then instead of moving to the left-periphery (or perhaps, to a more leftward position), a contrastively focused phrase should tend to be the rightmost of the preverbal phrases. We call this the *Head Proximity Hypothesis*, where proximity is operationalized as line-

ar proximity of the contrastively focused phrase to the sentence-final verb. This hypothesis follows from a separation of topic and focus (or theme and rheme) in which topic is normally placed early in the sentence, and focused information occurs late in the sentence, even though other factors can easily alter this general pattern (e.g., Kim, 1988; Lambrecht, 1996).

These two hypotheses make opposing predictions about contrastively focused phrases. The Conceptual Accessibility Hypothesis predicts that the focused phrase will be produced early in the sentence, while the Head Proximity Hypothesis predicts it will occur late, and specifically just prior to the verb.

To test these hypotheses, we developed three types of dative sentences as in (4). Dative sentences provide good testing cases since their three preverbal arguments allow multiple possibilities for word order. Moreover, the existence of and possible reasons for the canonical order for the dative structure has been explored using the same or similar experimental tasks (e.g., Dennison, 2008), so the current results have bases for further comparison. Here, the sentences are shown in the canonical order, but this is not how participants received the materials (see the materials section).

(4) a. No contrastive focus marker (Broad Focus)
Yumyengin-i   yuchiwon-ey   khetalan sikyey-lul   senmwulhaysse.
celebrity-NOM kindergarten-DAT big clock-ACC   presented.
'A celebrity presented a big clock to a kindergarten.'

b. Contrastive focus marker on the dative argument (IO Focus)
Yumyengin-i yuchiwon-ey-**man** khetalan   sikyey-lul senmwulhaysse.
celebrity-NOM kindergarten-DAT-only big clock-ACC presented.
'A celebrity presented a big clock only to a kindergarten.'

c. Contrastive focus marker on the accusative argument (DO Focus)
Yumyengin-i   yuchiwon-ey   khetalan   sikye-**man** senmwulhaysse.
celebrity-NOM kindergarten-DAT big clock-only   presented.
'A celebrity presented only a big clock to a kindergarten.

All sentences in each test condition contained a subject, an indirect object (IO), a direct object (DO), and a ditransitive verb. Moreover, only inanimate referents were chosen for both IOs and DOs to avoid any unintended variability due to an animacy difference for these two phrases. Instead, the critical manipulation was the presence of the contrastive focus marker -*man* on the IO, the DO, or neither phrase. If participants are sensitive to the conceptual aspect of the contrastive focus, or to the need for head proximity, then we should be able to observe word order variation depending on the presence or absence of the contrastive focus marker –*man*.

More specifically, the *Broad Focus* condition in (4a) served as a baseline condition to collect the default word-order preference for the experimental materials. Based on Dennison's (2008) results, we anticipated a weak preference for the canonical order since the dative and accusative arguments were both inanimate.

The *IO focus* and *DO focus* conditions allowed a direct testing of the two hypotheses described above. For the Conceptual Accessibility Hypothesis, we predicted two patterns of evidence: strong and weak. Strong evidence for a conceptual accessibility effect would be obtained if the focused element reliably takes the earliest possible position in the sentence. Therefore, in the *IO focus* condition we should find a higher percentage of the [*IO*–S–DO–V] order than other grammatical options, whereas in the *DO focus* condition we should find a higher portion of the [*DO*–S–IO–V] order.

Weaker evidence for the conceptual accessibility hypothesis would come from results where the focused element takes the second earliest possible position in the sentence: hence, the preferred order should be [S–*IO*–DO–V] in the *IO focus* condition and [S–*DO*–IO–V] in the *DO focus* condition. (Since the subject phrase was always animate, this pattern might suggest that animate phrases have higher accessibility than contrastively focused inanimate phrases.)

However, the Head Proximity Hypothesis predicts that the preverbal position is the focus position. If this is true, we should find the focused item immediately before the verb, and the preferred orders should be [S–DO–*IO*–V] in the *IO focus* condition and [S–IO–*DO*–V] in the *DO focus* condition. (5) – (7) summarize the dominant production pattern predicted for each condition. Note that because past results have shown a mix of word orders with broad-focus presentation, options (6b) and (7c) could potentially occur for a significantly greater number of productions than in the broad-focus condition that serves as a baseline.

(5) Strongest evidence for the Conceptual Accessibility Hypothesis
    a. Broad Focus: S–IO–DO–V.
    b. IO focus: *IO*–S–DO–V.
    c. DO focus: *DO*–S–IO–V.

(6) Weaker evidence for the Conceptual Accessibility Hypothesis
    a. Broad Focus: S–IO–DO–V.
    b. IO focus: S– *IO*–DO–V.
    c. DO focus: S– *DO*–IO–V.

(7) Strongest evidence for the Head Proximity Hypothesis
    a. Broad Focus: S–IO–DO–V.
    b. IO focus: S–DO– *IO*–V.
    c. DO focus: S–IO– *DO*–V.

2.1 Participants

Eighteen native Korean speakers at the University of Hawai'i at Mānoa participated in a sentence production experiment and received $10 each in compensation. They were all born and raised in Korea and came to the United States for higher education.

2.2 Materials and task

The experiment employed a phrase-assembly task that was disguised as a phrase-recognition task (Dennison, 2008; Stallings et al., 1998; Yamashita and Chang, 2001). Each critical sentence (similar to (4) above) was separated into four phrases and presented in four boxes on the computer screen (see panel A in Figure 1).

For all critical trials, the subject and verb locations were fixed at the bottom-right and top-left corners respectively. However, the IO and DO locations on the computer screen were balanced between the bottom-left and top-right boxes in order to monitor any possible influence of the phrase location on word order preferences. Counterbalancing two levels of screen locations and three types of sentences (i.e., Broad Focus, IO focus, DO focus) yielded six experimental conditions. These conditions were rotated through the experimental items across six presentation lists following a Latin-square design.

Each experimental list included thirty critical sentences along with ninety filler sentences that varied in type and length (e.g., transitives, intransitives, instrumentals, wh-questions).

2.3 Procedure

After signing a consent form, each participant sat in front of a computer and read instructions for the goal and procedure of the experiment. The experiment goal was described as a memory test measuring how quickly participants would recognize sentence parts that they saw in previous trials. For this reason, forty percent of the fillers were presented twice during an experimental session.
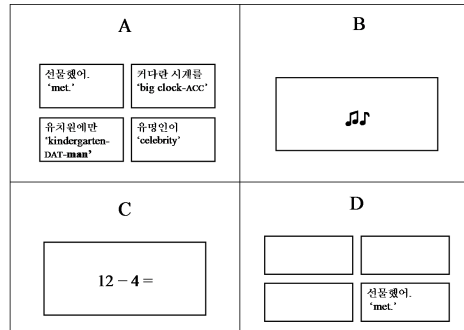
Figure 1. A sequence of a trial in one of the IO focus conditions
(The English translation was not given in the actual task.)

After the instructions, all participants received ten practice trials. For each trial, a fixation mark '+' was replaced with a screen showing four boxes that contained sentence fragments (as in panel A in Figure 1). If the sentence parts were exactly the same as the ones in any of the previous trials, then participants pressed a button as quickly as possible to indicate that they recognize these parts. This button press allowed a jump to the next trial.

However, if the sentence parts were new to the participants, then they connected the fragments to create a sentence in whatever order made sense to them and pressed a key to indicate the sentence completion. This key press led to a 1500 ms "pause" screen (panel B in Figure 1), which was replaced with a simple math problem (panel C). This secondary task was to prevent any immediate recall from the visual buffer and encouraged sentence production based upon meaning (Dennison, 2008; Yamashita and Chang 2001). After participants typed an answer to the math problem, the last screen of a trial displayed only the verb portion of the sentence fragments (panel D in Figure 1). Using this verb as a cue, participants spoke out loud the sentence they had prepared. Each production was recorded into a digital voice recorder for later coding and analysis.

Each participant experienced 120 trials including thirty critical ones and ninety fillers including the repeated materials. The order of presentation was pseudo-randomized, with the constraint that no two experimental items were shown consecutively. Each session took about one half hour on average with a range from 25 to 40 minutes. Nobody expressed any difficulty in understanding the task.

2.4 Accuracy Coding

Sentences produced by participants were first classified into two accuracy-coding categories: incorrect and correct productions. Incorrect trials included (1) items that were skipped due to false recognition, (2) productions with

the focus marker attached to an incorrect argument, and (3) productions with any missing arguments. Correct trials included productions where all grammatical markers including the focus marker were realized without any discrepancy from the original items. The only mistake that was accepted was lexical suppletion where proper names like John were substituted with similar names like Jake. Overall, ninety-six percent of the test items were produced correctly according to these criteria and there was no difference in accuracy across conditions. All correctly produced items were then coded for their word orders.

2.5 Results

The primary dependent measure was the percentage of sentences produced with the canonical order [S–IO–DO–V] in each experimental condition. We first performed two-way repeated measures of ANOVA tests to evaluate any effects of the two independent variables—sentence type and phrase location on the screen. The percentage of canonical orders varied significantly depending on the sentence type (a main effect of sentence type: $F_1(2, 34)=8.518$, $F_2(2, 58)=8.225$, both at p=.001). In addition, for each sentence type there were more productions of the canonical order when the indirect object was presented at the bottom-left corner of the computer screen (a main effect of phrase location: $F_1(1, 17)=7.119$, p=.016; $F_2(1, 29)=10.064$, p=.004). More importantly, however, the effect of sentence type did not interact with the effect of phrase location (no interaction effect: $F_1(2, 34)=.352$, p=.706; $F_2(2, 58)=1.485$, p=.235).

The uniform effect of phrase location enabled us to reduce the six testing conditions into just three, which allowed further explication of the sentence-type effect. Figure 2 below shows the percentages of word orders produced by participants (i.e., y-axis) in each sentence-type condition (i.e., x-axis). Each portion of the stacked bars represents word orders in three categories: the grey portion for the canonical order [S–IO–DO–V], the striped portion for the clause-internal scrambled order [S–DO–IO–V], and the black portion for all the other orders produced by participants.
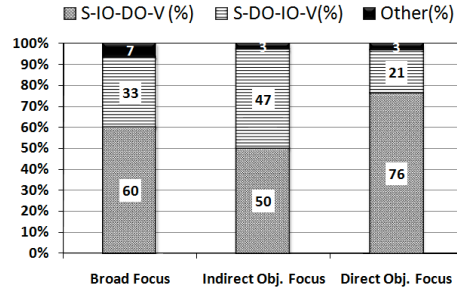
Figure 2. Proportions of word orders produced in each condition

One-way ANOVA tests on both participants and items found that percentages of canonical word order differed significantly depending on the sentence type (F_1(2, 34)=8.774, p=.001; F_2 (2, 58)=6.147, p=.004). When there was no focus marker in anywhere in the sentence (i.e., *Broad Focus* condition), participants produced the canonical order for 60% of the correct trials while producing the shifted order for 33% of the time.[1]

When the contrastive focus marker *–man* was attached to the indirect object (i.e., the *IO focus* condition), however, speakers' preference for the canonical order was reduced to only 50%. Instead, the number of productions in the order that placed the focused indirect object immediately preceding the verb (i.e., [S–DO–*IO*–V]) was significantly increased to 47% (pairwise comparison of *Broad Focus* and *IO focus*: t_1=2.11, p=0.07; t_2=2.05, p=0.01). This supports the Head Proximity Hypothesis. Participants rarely produced word orders that placed the focused element at the sentence beginning: only 1.9% of trials carried the [IO–S–DO–V] order and only 0.6% showed the [IO–DO–S–V] order. These results disconfirm the strong version of the Conceptual Accessibility Hypothesis.

As for the *DO focus* condition, we again found no support for the strong Conceptual Accessibility Hypothesis. There were no productions in this condition that placed the focused DO at the sentence beginning. Moreover, productions that placed the focused DO at the second position of the sentence (i.e., [S–*DO*–IO–V]) decreased significantly from both the baseline condition (pairwise comparison of *Broad Focus* and *DO focus*: t_1=2.11, p=0.02; t_2=2.05, p=0.15) and the *IO focus* condition (pairwise comparison of *IO focus* and *DO focus*: t_1=2.11, p<0.001; t_2=2.05, p<0.001). This goes

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[1] This general preference for the canonical order was stronger in the current study than in the comparable condition in Dennison (2008, 48%). It could be that participants interpreted inanimate datives metonymically more often in the current study than in Dennison (2008). Participants in the current study experienced only inanimate datives, whereas people in the previous study received both animate and inanimate datives.

against the weaker version of the Conceptual Accessibility Hypothesis. Instead, we found a significant increase in the number of productions with the focused direct object in the preverbal position ([S–IO–*DO*–V], pairwise comparison of *Broad Focus* and *DO focus*: t_1=2.11, p=.009; t_2=2.05, p<.000). This supports the Head Proximity Hypothesis.

3. General discussion

The current study found that contrastive focus exerts a strong influence on speakers' word order choices. Moreover, the direction of the influence aligned closely with the predictions of the Head Proximity Hypothesis but failed to support the Conceptual Accessibility Hypothesis. Speakers' preference for the canonical order in the Broad-Focus condition was diminished in the IO-focus condition and boosted in the DO-focus condition to place focused materials in the preverbal position.

Therefore, the current study provided behavioral evidence that the preverbal position is indeed a focus position in Korean, confirming the previous observation made from studies of syntactic typology (e.g., Kim, 1988). Interestingly, while Kim laid out the discussion in terms of rhematic focus, our results suggest that the preference to place focused phrases pre-verbally extends to contrastive focus.

However, it might seem surprising that contrastive focus, as a conceptual factor, does not seem to affect conceptual accessibility during sentence production. One possible explanation for the lack of a conceptual accessibility effect could be the nature of the phrase assembly task. The task allows good control of the sentential material, but at a cost of naturalness. It is possible that the artificiality of an assembly task might minimize conceptual accessibility effects. While we cannot completely rule out this possibility, we note that an identical task was successful in detecting effects of animacy on word order in Dennison (2008).[2]

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[2] Prat-Sala and Branigan (2000) have proposed that the ultimate influence of an entity's conceptual accessibility is in fact the added influence from two types of conceptual accessibility. One type is inherent accessibility, which is determined by an entity's inherent semantic properties such as animacy, prototypicality, and concreteness. Due to its intrinsic nature, inherent accessibility remains constant across contexts.

The other type is derived accessibility. That is, an entity's inherent accessibility can be influenced by extrinsic factors such as linguistic or non-linguistic contextual factors. Both given information and contrastive focus fall into this later category of accessibility.

Using two sentence production experiments, Prat-Sala and Branigan (2000) showed that derived accessibility can supplement the influence of inherent accessibility. Speakers in their experiments preferred word orders that allowed an early mention of entities that had been discussed in the previous discourse. Moreover, this pattern was stronger when the previously

We suggest that the conceptual complexity inherent to contrastive focus mitigates its conceptual accessibility. Take the example in (8).

(8) Visiting the home of the Simpsons, Santa gave a gift only to Lisa.

The meaning that this sentence conveys is not just that Lisa received Santa's gift. There is also a strong implication that some other children did not get the gifts. Anybody who is familiar with the TV show *The Simpsons* will understand that the children are specifically Bart and Maggie (while someone unfamiliar with the show might infer one or more unidentified children).

As such, understanding contrastive focus involves computation of both the focused target and the alternative set. Computing the alternative set depends heavily on the potential candidates in a projected discourse context. The complexity involved in these additional processes may impose a processing burden to the production system, hence working against early mention. The demands of constructing an alternative set would presumably have been particularly high in our task, which did not provide contexts to aid the establishment of alternative sets.

We noted above that given information is also treated as conceptually salient. Given information likewise requires consideration of the discourse context, but it is arguably much easier to track what has already been mentioned or implied than to construct an alternative set. An important next step in this line of research is to examine the effects of contrastively focused versus given information in more natural contexts.

One final consideration is that in this study, the subject was always animate, and both the indirect object and the direct object were always inanimate. Under these circumstances, speakers preferred to place the contrastively focused items immediately before the verb. It may be the case that the conceptual accessibility of the animate subject made it particularly well-suited for early mention, competing successfully with the contrastively focused phrase for that position. Another avenue for future research is to explore these effects with varying animacy across the argument phrases.

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mentioned items were animate entities rather than inanimate entities. Their results suggest that derived accessibility is a transitory property that is tied to particular linguistic or non-linguistic discourse factors.

The animacy effect found in Dennison (2008) is an effect of inherent accessibility. Korean speakers produced more canonical order [S-IO-DO-V] when the indirect object was animate than when it was inanimate. It is possible that the phrase-assembly task can detect effects of inherent accessibility, but not those of derived accessibility.

The current study's findings together with the previous results suggest that sentence production is simultaneously influenced by multiple factors (both universal and language-specific factors). Despite the overall results supporting the Head Proximity Hypothesis, we found a mix of word orders in each condition. In particular, the 50% of productions in canonical order [S–*IO*–DO–V] in the IO-focus condition suggests some competition among multiple factors during sentence production.

First of all, we saw a preference for the canonical order, which may have been shaped from speakers' general tendency to mention animate-like recipients in describing an object transfer event (i.e., an overgeneralization from typical patterns of animacy). Second, the structural patterns in the grammar of Korean and people's experiences with those patterns may justify the preverbal position as a focus position in Korean. Lastly, although the saliency of contrastive focus may indeed have increased the accessibility of the phrase in some respects, the need to compute an alternative set may have increased the processing time needed for the phrase and worked against its early mention.

For efficient processing, the production system needs to simultaneously satisfy as many constraints as possible. One order that was highly favored by the participants in this study (occurring with 76% of productions) was [S–IO–*DO*–V] for contrastively focused direct objects. This order satisfied (1) the canonical order constraint, (2) the head-proximity constraint for a focused element, and (3) late mention of conceptually complex information. This is a clear piece of evidence that linear word order in sentence production results from the competition among multiple factors.

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