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Parenthesized modifiers in English and Korean: What they (may) mean

Carolyn Jane Anderson & Yoolim Kim*

Abstract. Although the semantics of some classes of parentheticals are well studied, such as appositives, there is relatively little work on parentheticals marked with parentheses. Lewen & Anderson (2022) analyze the semantics of a certain parenthesized construction they refer to as a *restricted parenthesized parenthetical*, and propose that the parentheses invoke and negate an alternative to the parenthesized content. This paper presents experimental evidence about the interpretation of parenthesized modifiers in Korean and English, manipulating syntactic position and modifier properties (scalar/non-scalar, categorical/continuous). In both languages, our results confirm Lewen & Anderson (2022)’s proposal that some alternative is negated; however, the impact of the modifier properties we explore is different in English and Korean. Our findings corroborate the richness of the (often neglected) semantico-pragmatic space of parenthesized content.

Keywords. parentheses; parentheticals; alternatives; Korean

1. Introduction. Existing work on parentheticals has focused on their use as appositives, speaker-oriented adverbials, and expressives (McCawley 1982, Ziv 1985, Potts 2002, Dehé & Kavalova 2007). There is little existing work on parentheticals that are marked with parentheses (Nunberg 1990) or on parentheticals outside of Indo-European (Kim 2012). This paper presents experimental evidence about the interpretation of one kind of parenthesized parenthetical in both American English and Korean.

We focus on a parenthesized construction discussed in Lewen & Anderson (2022), which they refer to as a Restricted Parenthesized Parenthetical (RPP). This construction gives rise to an implication that its non-parenthesized counterpart does not, as shown in (1).

- (1) a. Sam studies linguistics for (intellectual) profit. # And actual profit.
- b. Sam studies linguistics for intellectual profit. And actual profit. (Lewen & Anderson 2022)

Lewen & Anderson (2022) highlight key differences between this construction and better-studied classes of parentheticals like appositives. They propose an analysis in which the parentheses act as a focus-sensitive operator, invoking and negating a set of alternatives to the parenthesized content.

In this paper, we test their hypothesis that RPPs invoke and negate alternatives experimentally in a dialogue interpretation task. We explore the effect of two semantic properties of the parenthesized modifier and present a cross-linguistic comparison between American English and a language with different syntactic restrictions on parentheticals: Korean.

A key difference between Korean and English is that in Korean, the parenthesized parenthetical can come on either side of the modified noun, as in (2), while in English RPPs, it must be on

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the left (Nunberg 1990). It is not known whether the meaning contribution of RPPs in Korean is similar to English, or whether the two syntactic positions correspond to differences in meaning.

- (2) a. Sam-neun (cicek) iik-ul wuyhay enehak-ul kongpu-ha-p-ni-ta
 sam-TOP (intellectual) gain-ACC for linguistics-ACC study-do-AH-IND-DECL
 Sam studies linguistics for (intellectual) profit.
- b. Sam-neun iik-ul (cicek) wuyhay enehak-ul kongpu-ha-p-ni-ta
 sam-TOP gain-ACC (intellectual) for linguistics-ACC study-do-AH-IND-DECL
 Sam studies linguistics for (intellectual) profit.

We test this experimentally in dialogue interpretation task, where participants judge whether alternatives to the parenthesized content are excluded in the context. We manipulate two key semantic properties of the modifiers: whether they are scalar or non-scalar; and whether they are continuous or categorical. We also explore the syntactic position of the parenthesized component in Korean.

Our cross-linguistic comparison reveals that although the Korean and American English constructions appear similar syntactically, their semantics are not identical: while both languages are consistent with Lewen & Anderson (2022)’s analysis of RPPs as negating alternatives, the effect of modifier properties differs between the two languages. These findings highlight the need for more work exploring the fine-grained meaning contribution of parentheses cross-linguistically.

2. Restrictive Parenthesized Parentheticals. Parentheticals comprise a broad class of linguistic phenomena, including appositives, speaker-oriented adverbials, expressives, and more. What unites them is a sense that they contribute “extra” information or commentary beyond the basic meaning contribution of the sentence. A key property of parentheticals is independence: they can be removed or omitted without affecting their host sentence. Much previous work has focused on understanding the extent to which parentheticals are syntactically and semantically independent (McCawley 1982, Potts 2002, 2005, Blakemore 2006, Dehé & Kavalova 2007, De Vries 2007, Dehé 2009, Blakemore 2009, McInnerney 2020). McCawley (1982) argues that parentheticals are not always syntactically independent of their hosts: in (3), for instance, the object of the verb *sells* in the parenthetical *Bill knows a man who sells* is the host sentence object.

- (3) Mary buys, and Bill knows a man who sells, pictures of Elvis Presley.

Even in these cases, though, the host sentence is still independent, since the entire parenthetical could be deleted without affecting the grammaticality or interpretation of its host.

In one of the few works that engages with parenthesized parentheticals, Nunberg (1990) asserts that the host sentences of parenthesized parentheticals are always independent, writing that “the content of a parenthetical must be entirely irrelevant to the syntactic or semantic well-formedness of the surrounding text” (Nunberg 1990; p. 106). However, Lewen & Anderson (2022) show that the host sentences of one kind of parenthesized construction, which they call the Restrictive Parenthesized Parenthetical (RPP), are not independent. They provide corpus examples of the construction, such as (4) below, where removing the parenthetical results in ungrammaticality.

- (4) Such a set would preserve the print and (some) of the tools used to create it. (Davies 2008; taken from Lewen & Anderson (2022))

They also argue that the meaning of the parenthesized component and its host are more closely

intertwined than traditional parentheticals, which, as Nunberg writes, leave behind “a coherent and complete communication” when removed (Nunberg 1990; p. 106). For instance, removing the parenthesized component in (5) makes the host sentence infelicitous in the given context.

- (5) *Context: Calvin has eaten some, but not all, of the cake.*
 a. Calvin didn’t eat (all of) the cake.
 b. # Calvin didn’t eat the cake. (Lewen & Anderson 2022)

Thus, though RPPs, like better-studied classes of parentheticals, seem to add “extra” information, they do not have the same degree of independence as other kinds of parentheticals.

2.1. PARENTHESES AS FOCUS OPERATORS. Lewen & Anderson (2022) propose an analysis of the semantics of RPPs centered around the infelicity of the continuation shown in (1-a) and (6-a).

- (6) a. Sally drinks (herbal) tea before bed. # Or black tea.
 b. Sally drinks herbal tea before bed. Or black tea.

They argue that the parentheses in an RPP work like a focus operator in that they invoke alternatives to parenthesized content. In their proposal, the infelicity arises because the parentheses negate an alternative to their contents. In (1-a), the most contextually salient alternative is financial gain. This negated alternative conflicts with the continuation, leading to infelicity for the RPP, but not its non-parenthesized equivalent.

In the Lewen & Anderson (2022) analysis, RPPs assert their non-parenthesized equivalent and presuppose the negation of a contextually salient alternative to the parenthesized component. Their proposed semantics are shown in (7).

- (7) **Semantics of the RPP construction** (Lewen & Anderson 2022):
 $[[\alpha(\beta)]]^C =$
 a. Asserts: $\alpha\beta$
 b. Presupposes: $\exists \text{ALT}' \subseteq \text{ALT}_C(\beta). \forall \delta \in \text{ALT}'. (\neg \alpha\delta) \wedge (\delta >_C \beta)$ where ALT_C takes a constituent γ and returns a set of relevant alternatives to γ and $>_C$ is an alternative strength criterion in C .

Example (8) shows how their analysis treats (6-a).

- (8) **Meaning contribution of (6-a) according to (Lewen & Anderson 2022)**
 a. Asserts: Sally drinks herbal tea before bed.
 b. Presupposes:
 $\{\neg \text{Sally drinks white tea before bed}, \neg \text{Sally drinks oolong tea before bed},$
 $\neg \text{Sally drinks green tea before bed}, \neg \text{Sally drinks black tea before bed}\}$

The RPP in (6-a) contributes the assertion that Sally drinks herbal tea, as well as the presupposition that Sally does not drink some other kind of tea. Given the context, a plausible set of alternatives to be excluded are alternatives that involve more strongly caffeinated tea.

In this paper, we test Lewen & Anderson (2022)’s proposal that RPPs negate alternatives, and explore a question that Lewen & Anderson (2022) leave open: how the alternative(s) are selected.

2.2. ALTERNATIVES IN RPPs. Lewen & Anderson (2022) propose that the parentheses in RPPs

negate alternatives to their content. However, they leave open the set of alternatives involved, both in terms of its size and its selection, providing examples in which all alternatives seem to be negated (9), as well as examples where some alternatives do not seem to be excluded, such as (10).

- (9) Often Sally drinks (herbal) tea before bed. # Or black tea. # Or green tea. (Lewen & Anderson 2022)
- (10) Context: For health reasons, Arjun tries not to eat red meat, and he also dislikes turkey.
- a. # Arjun avoids only RED meat.
 - b. Arjun avoids (red) meat. (Lewen & Anderson 2022)

In (10), there is a contrast between the RPP and *only*, which is known to negate all alternatives to its associate (Horn 1969, Rooth 1985). One possibility is that it is only stronger alternatives that are negated. However, it is not clear how to define strength: Lewen & Anderson (2022) explore and reject both logical strength and comparative likelihood.

Our experiment seeks to shed light on alternative exclusion by manipulating two semantic properties of the parenthesized modifiers: whether they are scalar, and whether their category boundaries are categorical or continuous. If alternative strength is relevant, this may be easiest to observe with scalar modifiers, which have a natural ordering. On the other hand, if only a single alternative is negated, this may be easiest to observe with categorical modifiers, where the boundaries between alternatives are most clear.

2.3. CROSS-LINGUISTIC COMPARISON. Our work seeks both to test Lewen & Anderson (2022)’s analysis of American English RPPs, and to investigate the cross-linguistic stability of the construction’s meaning contribution. We compare the interpretation of RPPs in American English with Korean, a language with little existing research on parentheticals (Kim 2012). Korean offers an interesting comparison because it provides a syntactic alternation: the parenthesized modifier can appear either to the left or right of the noun (11), even though it can only appear on the left in the non-parenthesized version (12).¹

- (11) a. sally-neun cak-ijeney cha-lul (tay-chwu) ma-sin-ta
Sally-TOP sleep-before tea-ACC (jujube) drink-IND-DECL
Sally drinks tea (herbal) before bed.
- b. sally-neun ca-ki-jen-ey (tay-chwu) cha-lul ma-sin-ta
Sally-TOP sleep-before (jujube) tea-ACC drink-IND-DECL
Sally drinks (herbal) tea before bed.
- (12) a. sally-neun ca-ki-jen-ey tay-chwu cha-lul ma-sin-ta
Sally-TOP sleep-before jujube tea-ACC drink-IND-DECL
Sally drinks herbal tea before bed.
- b. *sally-neun ca-ki-jen-ey cha-lul tay-chwu ma-sin-ta
Sally-TOP sleep-before tea-ACC jujube drink-IND-DECL
* Sally drinks herbal tea before bed.

In English, by contrast, RPPs can only appear to the left. This was first observed by Nunberg

¹Although the translation notes ‘herbal’, we use a more culturally-relevant tea, ‘jujube tea’, which is often had before sleep. This substitution is meant to provide a comparable context with a less caffeinated tea.

A: Are you still doing a lot of volunteer work for the pet shelter?
 B: I don't do as much as I used to, but I still write their (weekly) newsletter.

Question: Which kinds of newsletters do you think B doesn't help to write?

- ☐ daily
- ☐ monthly
- ☐ Other: _____

Figure 1: Example item from the Scalar Categorical condition.

(1990), who distinguishes two classes of parenthesized parentheticals: constituents of lexical phrases, like Lewen & Anderson (2022)'s RPPs, that appear to the left of their heads, and parentheticals belonging to what he calls the *text-grammar*, which must come after their heads:

- (13) a. *They include (as they put it) "free gifts" with every purchase.
 b. They include "free gifts" (as they put it) with every purchase. (Nunberg 1990)

Thus, in English, syntactic position demarcates two classes of parenthesized parentheticals, with parentheticals that are tightly integrated into their lexical phrases appearing to the left.

In Korean, both syntactic positions are possible for RPPs; however, it is not known whether their interpretation differs based on their position. For Korean, therefore, we can explore the meaning impact of the syntactic manipulation as well as of the different classes of modifiers.

3. Experimental Design. To determine whether RPPs negate alternatives to their parenthesized content, we ran two forced-choice dialogue interpretation tasks. Experiment A explores the interpretation of RPPs in English and Experiment B explores their interpretation in Korean.

3.1. PROCEDURE. Both experiments used a dialogue interpretation paradigm with two interlocutors, A and B. The first interlocutor poses a question, and the second replies with a sentence containing an RPP. The participant was then asked to select from a list of alternatives to the parenthesized content all alternatives that are not compatible with the given context.

For instance, in the item shown in Figure 1, B's utterance contains the RPP (*weekly*) *newsletter*. The answer options contain two alternatives to *weekly*, *daily* and *monthly*. Participants were asked to judge which of these options, if any, are ruled out by B's utterance. Participants could select one or more options. They could also provide a different response using the Other option.

3.2. CONDITIONS. We manipulated two properties of modifiers:

Scalarity Some modifiers naturally fall onto a scale. For instance, *warm* represents the mid-range on a temperature scale, between *hot* and *cold*. Some scales may be highly salient in certain contexts. For instance, in the context of drinking tea right before bed, the caffeine level of each kind of tea becomes salient. We call these modifiers **scalar**. On the other hand, other modifiers do not easily form an ordered scale. For instance, the set of flavors for a particular candy may fall into discrete categories, but these categories do not occur in any order. Similarly, cardinal directions in English are conventionally listed with South and North "bordering" East and West, but the listing

can begin at any position; these modifiers form a cycle rather than a scale. We call these kinds of modifiers **non-scalar**.

We classify modifiers into two groups based on whether there is a salient scale available for ranking them. For scalar modifiers, we parenthesize a middle element from the scale in order to test whether alternative strength matters in the interpretation of RPPs. For non-scalar modifiers, we simply select two alternatives.

Continuity Another modifier property that may be relevant is the nature of the category boundaries. We group modifiers based on whether they demarcate clear and exclusive category boundaries. For instance, levels of school (*elementary, middle, high*) are discrete categories with clear boundaries: a student is not typically in both kinds of schools at once. We call modifiers like these **categorical**. On the other hand, the boundaries between times of day may be more negotiable. For instance, between *morning* and *afternoon*, we could create additional distinctions like *late morning, early afternoon, or brunch time*. We call modifiers like these **continuous**.

Size Size modifiers are common in RPPs, but challenging to categorize by our criteria. Although size is clearly scalar, in some contexts, size boundaries are fuzzy, while in others, they are conventionalized. For instance, t-shirts and to-go beverage cups come in discrete size categories, but pets do not, leading to some degree of ambiguity when apartment listings allow small dogs only. For this reason, we include size modifiers as a separate condition. We use *medium* as the parenthesized modifier for all items in the size condition, and select *small* and *large* as the alternative options.

Syntactic Position In Korean, we tested an additional manipulation of position: the parenthetical appeared either to the right or the left of the modified noun.

3.3. ITEMS. We crossed scalarity and continuity to create four modifier conditions: Scalar Categorical, Scalar Continuous, Non-Scalar Categorical, and Non-Scalar Continuous. For each modifier condition, we constructed ten dialogue sets, each with a different modifier within the category. We also constructed six dialogues with size RPPs. Appendix B gives an example of each condition.

For Korean, we presented half of the items in each syntactic position. Thus, English participants judged ten items in each main condition and six size items, for a total of 46 items; Korean participants judged five main and three size items for each syntactic position, for a total of 46 items. We also included three training items and three filler items. The training included an item where none of the options were appropriate, to model the use of the Other option (Appendix A).

3.4. PARTICIPANTS. Data was collected from 32 native Korean speakers and 32 monolingual English speakers. We collected information about the languages spoken in each participant's childhood households and the language of instruction in the school they attended most recently. We used this information to exclude participants with significant exposure to a language other than the target language.

3.5. FREE RESPONSE DATA CODING. Participants were allowed to select an Other option and write in a response. These responses were coded into the following categories:

- NONE: none of the options are excluded; all of them are possible in the context.
- ALL: all of the options listed are excluded; any other option would be excluded.
- HIGH: something stronger than what is parenthesized is excluded.
- LOW: something weaker than what is parenthesized is excluded.

- JUSTIFY: the answer simply justifies the selected options.
- SPECIFICOTHER: mentions a specific alternative that is excluded (other than A or B).
- FOCUSOTHER: suggests an alternative to an element other than the target modifier.
- UNDECIDABLE: the context does not provide enough information to decided.
- PARENTHEZIZED: the parenthesized item is excluded.
- IRRELEVANT: the response is unclear or unrelated to core question.

The same coding categories were used for Korean and English responses. Examples of responses in each category can be found in Appendix C. We consider Parenthesized and FocusOther as error cases, where participants misunderstood the task or context.

3.6. STATISTICAL ANALYSIS. We fit mixed-effects logistic regression models to the response data from each experiment. We fit models for each language for each of the three main response patterns: selecting both alternatives (Both), selecting a single alternative (Single), or Other. We also fit a model to the pooled Korean and English data to explore between-language differences.

4. Results.

4.1. EXPERIMENT A: ENGLISH. Experiment A explores the interpretation of RPPs in English. According to the analysis put forward by Lewen & Anderson (2022), RPPs invoke and negate an alternative to their parenthesized content. If this is correct, we expect participants to choose at least one of the alternatives (or to suggest their own). If participants do not select any alternatives or they write that all are possible, this would indicate that RPPs do not necessarily negate an alternative.

Experiment A explores five classes of modifiers. We manipulate whether the modifier is scalar or not and whether it is continuous or categorical. We include size as a separate category, because depending on context, it can be either continuous or categorical.

4.1.1. MAIN CONDITIONS. Overall, we find that most participants select at least one alternative as excluded given the dialogue (88%). This is consistent with Lewen & Anderson (2022)’s hypothesis that RPPs negate an alternative to their parenthesized content.

4.1.2. SCALAR AND NON-SCALAR CONDITIONS. We observe different response patterns between modifier conditions. Figure 2 shows the response selection patterns for the four main modifier conditions. There is a clear difference between Scalar and Non-scalar conditions in the distribution of other responses. In Non-scalar conditions, the majority of participants select both alternative options (49.3% Both; 18.9% High; 15.5% Low), indicating that multiple alternatives are negated. In the Scalar conditions, by contrast, the most common response type is to select only one of the alternatives (36.9% High; 33.6% Low; 19.7% Both). There was a significant negative effect of Scalarity in the English Both mixed-effects model and a significant positive effect of Scalarity in the English Single mixed-effects model (Appendix D).

We do not see as strong of an effect from manipulating the nature of the categories, though category type seems to interact with scalarity. In the Scalar Continuous condition, there are fewer Both responses than in the Scalar Categorical condition, while in the Non-scalar Continuous condition, there are even more Both responses than in the Non-scalar Categorical condition. The English Both and English Single mixed-effects models find no significant primary affect of Categorical, but confirm that its interaction with Scalarity is statistically significant (Appendix D).

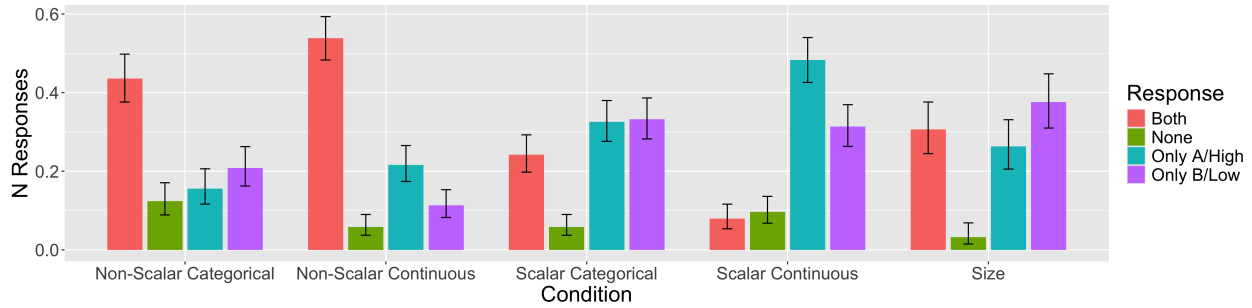


Figure 2: English option selections by modifier type. Error bars indicate 95% CIs.

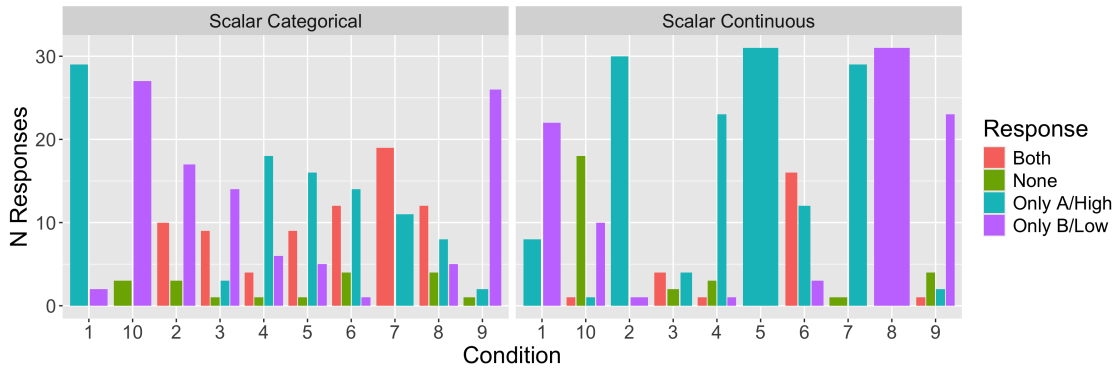


Figure 3: By-item responses for English Scalar conditions

One surprising finding is that it is not always the stronger alternative that is selected, when only one option is chosen: in the Scalar Categorical case, there are roughly even rates for both options. One possibility is that while participants are sensitive to the presence of a scale, they differ its ordering. Perhaps in Low cases, participants are using the expected scale, but reversing its direction. When we examine the response patterns in the Scalar conditions by item (Figure 3), we find that by item, most participants agree on which alternative is excluded. However, there is variability between items in whether it is the stronger or weaker alternative. This supports the hypothesis that a stronger alternative that is negated: if the alternative selection were arbitrary, we would expect items with roughly equal numbers of strong and weak selections.

Our paradigm is not designed to differentiate between excluding a single stronger alternative or excluding all stronger alternatives, since the scalar answer options consist of two alternatives on opposite ends of the scale. However, the free response data provides some tentative evidence of participants excluding all stronger alternatives. Ten of the responses indicate that any stronger alternative would be excluded and four indicate that any weaker alternative would be excluded.²

4.1.3. SIZE. The Size condition was included separately from the other modifiers because it can be hard to categorize as either continuous or categorical. Figure 3 shows the response patterns for the Size condition. As expected, Size patterns most similarly to the Scalar conditions. However, there is a somewhat larger proportion of Both responses, suggesting that it is closer to the Scalar

²For example, for an item with the scalar categorical RPP (*chapter*) books, one participant selected the stronger alternative, *textbooks*, and additionally wrote in, “books above the level of chapter books.”

Category	English	Korean
NONE	114	51
ALL	21	12
HIGH	10	5
LOW	4	4
JUSTIFY	6	0
SPECIFICOTHER	17	9
FOCUSOTHER	1	10
UNDECIDABLE	37	86
PARENTHEZIZED	5	9
IRRELEVANT	12	3

Table 1: Free responses by language and coded category.

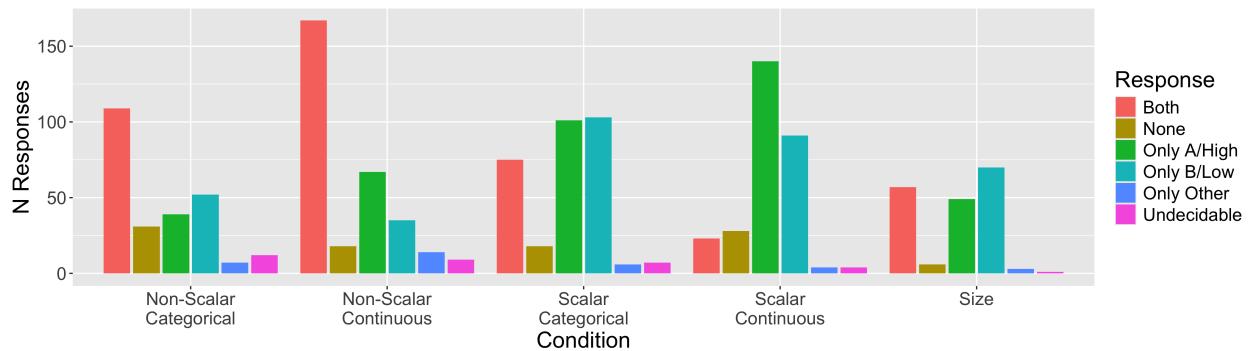


Figure 4: English results, including coded free response answers

Categorical condition than the Scalar Continuous.

4.1.4. FREE RESPONSES. The experimental design allowed participants to write in an option. Participants used this in a variety of ways: to provide justification for their choice (coded Justify); to specify additional excluded alternatives (SpecificOther); to indicate that all alternatives would be excluded (All), or that no alternatives would be excluded (None), or that there was not enough information to decide (Undecidable). Some responses were unclear or off-topic (Irrelevant).

Overall, English participants used the Other option 227 times (for 1426 items). The most common response category was None, followed by Undecidable (Table 1). Figure 4 shows the response patterns when the coded free responses are included. We combine the High category with responses where only the stronger alternative was checked (Only A); the Low category with Only B; and the All category with responses where both options were checked (Both).

The English Other mixed-effects model finds a significant effect of Categorical on Other responses and a significant interaction with Scalar, suggesting that participants had more trouble deciding for these categories (Appendix D). However, the rate of None and Undecidable responses is low in all conditions, suggesting that most participants were sensitive to RPP alternatives.

4.2. EXPERIMENT B: KOREAN. Experiment B explores the same modifier conditions as the English experiment, but with an additional manipulation of syntactic position. We manipulate

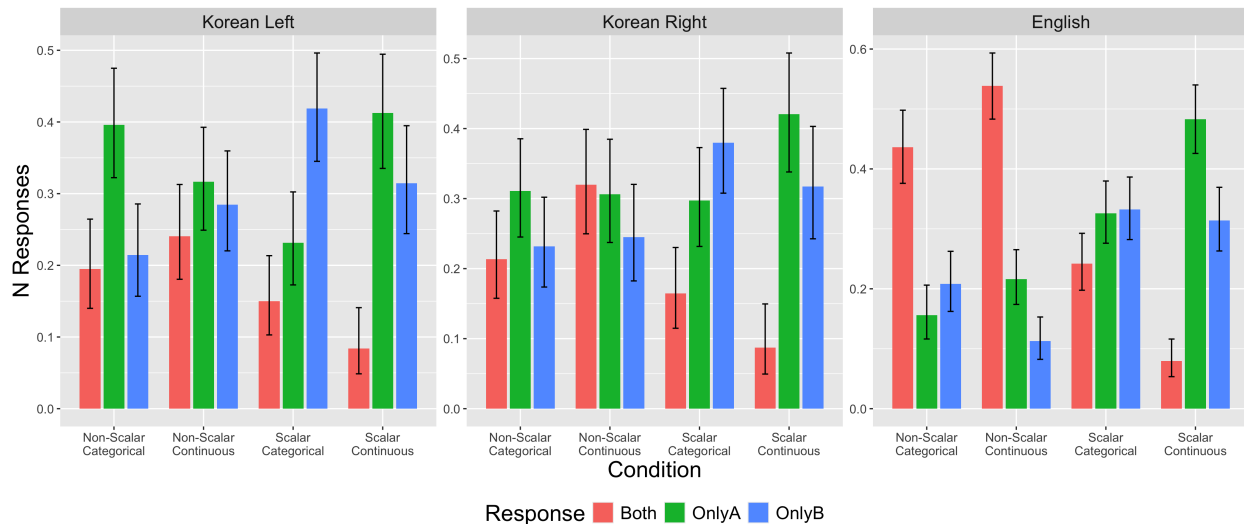


Figure 5: Option selections by language, modifier type, and position. Error bars indicate 95% CIs. whether the parenthesized modifier appears to the right or to the left of its noun.

Figure 2 shows the Korean response selection patterns for the four main modifier conditions by syntactic position, compared with English. As in English, we find that most participants select at least one alternative (82%). However, the rate of Other selection is higher than in English.

The responses pattern very similarly for both right and left placement of the parenthetical, indicating that syntactic position is not associated with differences in meaning; none of the mixed-effects models find a statistically reliable effect of position (Appendix D).

The effect of modifier property is not as clear. In general, the response patterns are similar to English, but weaker, with large numbers of participants using each response strategy in every condition. The Korean Both mixed-effects model finds a significant positive effect of Scalarity and a marginal negative interaction with Categorical (Appendix D). Similarly, the Korean Single mixed-effects model finds a significant negative effect of Scalarity and a significant positive interaction with Categorical, echoing the English trends. However, although there are more Both responses in the Non-scalar conditions, it is not the most common response in any category: Korean participants most frequently select only one of the options across categories. The cross-language mixed-effects models confirm that this is a statistically reliable difference between the languages (Appendix D).

4.2.1. FREE RESPONSES. Korean participants used the free response option more frequently than English participants. They were also more than twice as likely to use this option to express that they did not have enough information to select any of the options (Undecidable). This was the most common free response category for Korean speakers (Table 1). Like English speakers, the None response category was also common.

When we combine the free responses with the option selection patterns, we again see few differences by syntactic position. For both positions, we see more Undecidable responses in the Non-scalar categories than the Scalar categories, as well as a more mixed pattern of options selections, with substantial numbers of participants selecting Both options, Only A, and Only B.

Although participant behavior is more mixed in the Korean experiment, the rate of participants

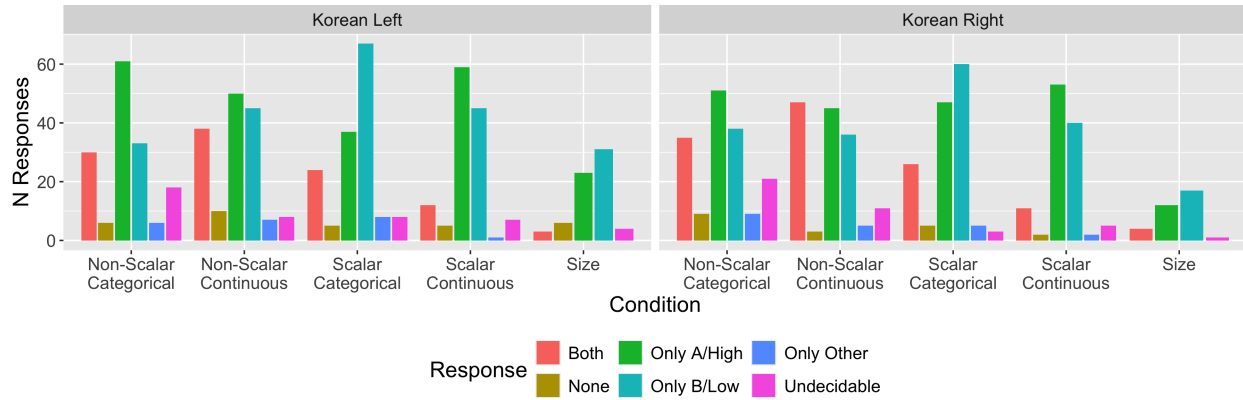


Figure 6: Korean results by syntactic position, including coded free response answers



Figure 7: Difference between Korean Only A/High and Only B/Low counts by condition.

responding with a None free response is consistently low across conditions, suggesting that Korean participants are sensitive to RPPs invoking some alternatives. An alternative explanation would be that Korean participants are more likely to write that they cannot decide rather than to write that no options are excluded. If this is the case, then the higher numbers of Undecidable responses may indicate that the alternative negation effect of RPPs is less strong in Korean.

4.2.2. ALTERNATIVE STRENGTH. As in English, we observe no clear preference for selecting the stronger alternative. Figure 7 shows the difference between stronger and weaker alternative selection counts. The preference for the stronger or weaker option is consistent by item, but does not pattern with modifier category, suggesting that it may be an artifact of the modifiers used in each item. This is consistent with the hypothesis that scale reversal is involved in cases where participants exclude only the weaker alternative.

5. Discussion. Experiment A and Experiment B explored the interpretation of RPPs in English and Korean. Overall, the results of both experiments confirmed Lewen & Anderson (2022)’s hypothesis that RPPs exclude alternatives to their parenthesized content. In both experiments, most participants selected at least one alternative to exclude.

The experiments also tested the impact of two modifier properties, scalarity and continuity. In

English, there is a strong effect of scalarity: in non-scalar conditions, most participants exclude both alternatives, while in scalar conditions, participants typically select only one alternative to exclude. Surprisingly, participants did not always select the strongest alternative in scalar conditions; we hypothesize, however, that this may be due to by-item cases of scale reversal. The differences between continuous and categorical modifiers were less strong; instead, continuity seems to interact with scalarity to intensify its effect, with non-scalar continuous modifiers receiving the most Both responses and scalar continuous modifiers receiving the fewest Both responses.

When we turn to the Korean results, we observe a similar but weaker effect of scalarity. In general, the Korean response patterns are more mixed across all modifier conditions. Although more participants excluded both options in non-scalar conditions compared to scalar conditions, across conditions, most participants excluded only one option. Moreover, Korean participants were more likely to say that the context did not provide enough information to decide against any of the alternatives. This suggests that the interpretation of RPPs in Korean is different from English, or at least less consistent: there seems to be more variability in how Korean RPPs are interpreted.

Overall, our results provide evidence in support of Lewen & Anderson (2022)'s theoretical account of RPPs for English, while illustrating the need for more cross-linguistic analysis of parenthetical constructions. The results of Experiment B provide a first look at the interpretation of parentheticals in Korean and suggest that more work is necessary to understand the meaning contribution of RPPs in this language.

6. Conclusion. We present experimental evidence about the interpretation of a particular kind of parenthesized parenthetical, the Restrictive Parenthesized Parenthetical. We test Lewen & Anderson (2022)'s hypothesis that RPPs invoke and negate at least one alternative to their parenthesized content, and explore the nature of the alternative(s) targeted. In Experiment A, we explore the interpretation of RPPs in English and investigate two key properties of the parenthesized modifiers. In Experiment B, we provide the first experimental evidence of how RPPs are interpreted in Korean, and explore the impact of syntactic position along with modifier properties.

Our results support Lewen & Anderson (2022)'s hypothesis that RPPs involve the negation of at least one alternative to their parenthesized content. We also answer an open question posed in Lewen & Anderson (2022) about the nature of the alternative set: we find that English RPPs with non-scalar modifiers negate all of their contextually relevant alternatives, while those with scalar modifiers negate alternates at one end of their scale. Finally, our results illustrate the need for more cross-linguistic work on the semantics of parentheticals: although our Korean data are consistent with the alternative-negation account of RPPs, the effect of modifier type is not clear-cut. We hope that future work will shed more light on cross-linguistic differences in the fine-grained semantics of parentheticals.

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Appendix

A Training Instructions

In this study, you'll see a short dialog between two speakers, A and B, like the one below:

A: What do you think I should wear to the party tonight?

B: I'm planning to wear a polo.

You will be asked a multiple choice about the dialog. You may have to draw some inferences about what A and B mean in order to answer the question. For instance, here is an example question about the previous dialog:

QUESTION: Based on B's information, which of the following shirts do you think A might consider wearing?

- ☐ a polo
- ☐ a button-down shirt
- ☐ Other: _____

You can check more than one option, if you think more than one of the shirts listed would be appropriate for A to wear.

For instance, you might infer that the party is not casual enough to wear a tee shirt, but A might be willing to wear either a polo or something slightly dressier. Or, you might think that A wants to avoid being too formal, so both the tee shirt and polo are possible.

We're interested in your interpretation of the dialogs. So you should pick however many options you think might work.

If none of the options seem good to you, you can write "none" in the Other category or suggest a different option.

A: Are you thinking about getting a pet?

B: I'm allergic to everything.

Question: Which of the following pets do you think B might adopt?

- ☐ a cat
- ☐ a dog
- ☐ Other: _____

Here's one last training item for you to practice on:

A: Do you think Mark will be ok if I make kimchi fried rice for dinner? I know he's picky.

B: He eats (seafood) fried rice.

Question: Which of the following kinds of fried rice do you think Mark will eat?

- ☐ kimchi
- ☐ egg
- ☐ Other: _____

B Example Stimuli from Each Modifier Condition

Scalar Categorical

A: How is Lulu's reading progressing?

B: She doesn't read (chapter) books yet.

Question: Which books do you think Lulu can't read?

- ☐ textbooks
- ☐ picture books
- ☐ Other: _____

Scalar Continuous

A: What would you like to have with the steaks?

B: They would go really nicely with some (moderately) roasted carrots.

Question: Which cooking styles does B think wouldn't go with the steaks?

- ☐ lightly
- ☐ very dark
- ☐ Other: _____

Non-Scalar Categorical

A: Do you think Liza will like these candies?

B: I know that she likes (strawberry) Hi-Chew.

Question: Which flavors do you think Liza might not like?

- ☐ mango
- ☐ apple
- ☐ Other: _____

Non-Scalar Continuous

A: I hear you're planning a trip to Europe! Where are you hoping to go?

B: I'm passionate about wine, so I'm planning a route through France and (southern) Germany.

Question: Which regions of Germany do you think B WON'T visit?

- ☐ western
- ☐ northern
- ☐ Other: _____

Size

A: I'm so excited for our trip to Denmark! How much luggage are you planning to bring?

B: Just my backpack and one (medium) suitcase.

Question: Which sizes of suitcase do you think B would NOT bring?

- ☐ small
- ☐ large
- ☐ Other: _____

C Free Response Coding

An example of a free response entry for each category from the English responses is shown below.

- NONE: "Liking strawberry doesn't imply disliking any other flavor."
- ALL: "Any jacket other than denim."
- HIGH: "Any cardigan made with heavy material."
- LOW: "Distances less than 5 miles."

- JUSTIFY: “All dogs might be allowed, because medium is kind of vague.”
- SPECIFICOTHER: “Suit.”
- FOCUSOTHER: “Dogs off the leash.”
- UNDECIDABLE: “Not enough information to know.”
- IRRELEVANT: “I’m not familiar with blanched or stir fried asparagus.”

D Mixed-effects Model Results

We fit mixed-effects logistic regression models to three response variables: Both selection (1 if both options are selected or there was a free response in the Both or High category, and 0 otherwise); Single selection (1 if exactly 1 of the options is selected or there was a free response in the High or Low category, and 0 otherwise); and Other selection (1 if neither of the given options were selected and the free response was not in the Both, All, High, or Low categories, and 0 otherwise).

Each model includes fixed effects of modifier scalarity (1 for Scalar conditions and 0 for Non-Scalar conditions) and continuity (1 for Categorical conditions and 0 for Continuous conditions). The Korean models additionally include syntactic position (A = left, B = right). Interaction terms were included for the fixed effects as well. Models also included random effects for participants and items, with maximal random effects structures.

Fixed effects	$\hat{\beta}$	z	p
Intercept	-0.8 (+/- 0.2)	-3.6	0.0003
Scalar	2.3 (+/- 0.2)	11.4	<0.0001
Categorical	-0.006 (+/- 0.2)	-0.03	0.98
Scalar*Categorical	-0.71 (+/- 0.3)	-2.4	0.01

Table 2: Mixed-effects English Single model

Fixed effects	$\hat{\beta}$	z	p
Intercept	0.17 (+/- 0.2)	0.7	0.48
Scalar	-2.8 (+/- 0.3)	-10.6	<0.0001
Categorical	-0.42 (+/- 0.3)	-1.6	0.11
Scalar*Categorical	1.6 (+/- 0.3)	4.7	<0.0001

Table 3: Mixed-effects English Both model

Fixed effects	$\hat{\beta}$	z	p
Intercept	-2.4 (+/- 0.3)	-7.2	<0.0001
Scalar	0.3 (+/- 0.3)	1.0	0.32
Categorical	0.59 (+/- 0.3)	2.3	0.02
Scalar*Categorical	-1.1 (+/- 0.4)	-2.8	0.005

Table 4: Mixed-effects English None model

Fixed effects	$\hat{\beta}$	z	p
Intercept	0.72 (+/- 0.4)	1.8	0.08
Scalar	0.97 (+/- 0.3)	2.9	0.004
Categorical	0.18 (+/- 0.3)	0.6	0.52
Position B	-0.09 (+/- 0.3)	-0.3	0.76
Scalar*Categorical	-0.70 (+/- 0.4)	-1.7	0.095
Scalar*Position B	0.66 (+/- 0.5)	1.4	0.17
Categorical*Position B	-0.32 (+/- 0.4)	-0.8	0.43
Scalar*Categorical*Position B	-0.05 (+/- 0.6)	-0.08	0.9

Table 5: Mixed-effects Korean Single model

Fixed effects	$\hat{\beta}$	z	p
Intercept	-1.57 (+/- 0.4)	-3.6	0.0002
Scalar	-1.18 (+/- 0.4)	-2.8	0.005
Categorical	-0.55 (+/- 0.3)	-1.7	0.09
Position B	0.24 (+/- 0.3)	0.76	0.45
Scalar*Categorical	1.34 (+/- 0.5)	2.5	0.01
Scalar*Position B	-0.63 (+/- 0.6)	-1.1	0.29
Categorical*Position B	0.0008 (+/- 0.4)	0.002	1.0
Scalar*Categorical*Position B	0.35 (+/- 0.8)	0.46	0.65

Table 6: Mixed-effects Korean Both model

Fixed effects	$\hat{\beta}$	z	p
Intercept	-2.9 (+/- 0.5)	-5.9	<0.0001
Scalar	-0.52 (+/- 0.4)	-1.2	0.25
Categorical	0.87 (+/- 0.4)	2.3	0.02
Position B	-0.16 (+/- 0.4)	-0.38	0.71
Scalar*Categorical	-0.02 (+/- 0.5)	-0.03	0.98
Scalar*Position B	-0.04 (+/- 0.7)	-0.06	0.95
Categorical*Position B	0.46 (+/- 0.5)	0.92	0.36
Scalar*Categorical*Position B	-0.58 (+/- 0.8)	-0.69	0.49

Table 7: Mixed-effects Korean None model

Fixed effects	$\hat{\beta}$	z	p
Intercept	-0.85 (+/- 0.3)	-2.9	0.004
Scalar	2.4 (+/- 0.2)	11.2	<0.0001
Categorical	0.07 (+/- 0.2)	0.35	0.73
Korean	1.39 (+/- 0.4)	3.6	0.0004
Scalar*Categorical	-0.80 (+/- 0.3)	-2.8	0.005
Scalar*Korean	-1.09 (+/- 0.3)	-3.4	0.0006
Categorical*Korean	0.01 (+/- 0.3)	0.03	0.97
Scalar*Categorical*Korean	0.17 (+/- 0.4)	0.4	0.69

Table 8: Mixed-effects Cross-Language Single model

Fixed effects	$\hat{\beta}$	z	p
Intercept	0.18 (+/- 0.3)	0.62	0.54
Scalar	-2.9 (+/- 0.3)	-10.5	<0.0001
Categorical	-0.39 (+/- 0.2)	-1.9	0.06
Korean	-1.43 (+/- 0.4)	-3.7	0.0002
Scalar*Categorical	1.7 (+/- 0.3)	5.2	<0.0001
Scalar*Korean	1.5 (+/- 0.4)	3.7	0.0002
Categorical*Korean	-0.31 (+/- 0.3)	-1.0	0.32
Scalar*Categorical*Korean	-0.37 (+/- 0.5)	-0.8	0.45

Table 9: Mixed-effects Cross-Language Both model

Fixed effects	$\hat{\beta}$	z	p
Intercept	-2.4 (+/- 0.4)	-6.8	<0.0001
Scalar	0.08 (+/- 0.3)	0.3	0.77
Categorical	0.57 (+/- 0.3)	2.2	0.03
Korean	-0.08 (+/- 0.5)	-0.2	0.87
Scalar*Categorical	-0.78 (+/- 0.4)	-2.1	0.03
Scalar*Korean	-0.35 (+/- 0.4)	-0.9	0.39
Categorical*Korean	0.13 (+/- 0.4)	0.4	0.70
Scalar*Categorical*Korean	0.37 (+/- 0.5)	0.7	0.49

Table 10: Mixed-effects Cross-Language None model