

Temporal mismatches and the acceptability of tenseless coordinate constructions in Korean*

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Park, Sang-Hee and Jungsoo Kim. 2021. Temporal mismatches and the acceptability of tenseless coordinate constructions in Korean. *Linguistic Research* 38(2): 301-327. In Korean, non-final conjuncts in coordinate constructions may appear without the tensed verb - as in Right Peripheral Ellipsis - or without the tense morpheme alone - as in bare *ko*-coordination. This paper presents a formal acceptability judgment study that explored whether and to what extent Korean speakers accept mismatches of temporal information between the conjuncts in these constructions. The study examined the factors whose effects have been controversial in previous theoretical studies: temporal reference (i.e., whether the conjuncts match in tense) and temporal organization (i.e., whether the conjuncts are ordered sequentially or reversed) across three coordinate structures (i.e., Right Peripheral Ellipsis, bare *ko*-coordination, and full coordination). The results show evidence of the effects of these factors on bare *ko*-coordination and evidence of the effect of temporal reference on Right Peripheral Ellipsis. They also reveal that Korean speakers exhibit a great deal of inter-speaker variation in their assessment of temporal mismatches in these constructions. We discuss the implications of the results for both theoretical and psycholinguistic research. (Duksung Women's University · Kyung Hee University)

Keywords Right Peripheral Ellipsis (RPE), bare *ko*-coordination, temporal mismatches, acceptability judgment, Korean

1. Introduction

Natural language provides a variety of elliptical constructions, where missing material is understood in the context of the remaining material. A long-standing question has been what exactly qualifies as a suitable context for ellipsis, and this question has been sought, among other ways, by attempting to identify what are known as the identity conditions,

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i.e., conditions that characterize what properties are required to be shared between missing material and its overt correspondent in the context (often called the *antecedent*).

The question of identity in ellipsis is a construction-dependent one. Some types of ellipsis, for example, are sensitive to mismatches in voice (e.g., Gapping and Sluicing) while others are not (e.g., VP ellipsis and Pseudogapping) (Johnson 2001, 2009; Merchant 2008, 2013; Tanaka 2011; Chung 2013). In the present study we investigate what we call Right Peripheral Ellipsis (RPE) in Korean, in conjunction with a related construction called bare *ko*-coordination, focusing on their temporal interpretations. RPE is an elliptical construction which has been attested in a variety of languages including English, French, and Japanese (Haspelmath 2007). As the name suggests, in RPE, some material on the right-periphery of a conjunct is missing, arguably under identity with a corresponding material in the same position of another conjunct. As exemplified in (1a) below, Korean RPE includes missing material in a non-final conjunct and its overt correspondent is found in the final conjunct. The construction is comparable to a full coordination marked by the conjunctive morpheme *-ko*, illustrated in (1b).¹

- (1) a. Mina-nun sakwa-lul, Jisu-nun pay-lul mek-ess-ta.
 Mina-TOP apple-ACC Jisu-TOP pear-ACC eat-PST-DECL
 ‘Mina ate apples and Jisu ate pears.’
- b. Mina-nun sakwa-lul mek-ess-ko, Jisu-nun pay-lul
 Mina-TOP apples-ACC eat-PST-and Jisu-TOP pear-ACC
 mek-ess-ta.
 eat-PST-DECL
 ‘Mina ate apples and Jisu ate pears.’

Because the missing material takes the right-periphery of a coordinate conjunct, Korean RPE has often been compared with and likened to Right-Node Raising (RNR) in English, e.g., *John likes, and Mary dislikes, apples* (Sohn 1994, 2001, 2004; Chung 2005a,b; An 2006; Kim 2006; Ha 2008; Park 2007, 2009). There has also been a view that Korean RPE is a variant of Gapping, e.g., *John likes apples and Mary pears* (Ross 1970; Kim 1998; Lee 2005; Cho 2006; Kim and Cho 2012). This latter view concentrates on the fact that missing material in Korean RPE necessarily involves a main verb, which

1 The expression in the English translation marked with a strikethrough corresponds to the missing material in the original example.

is a direct consequence of the language being verb-final. As reflected in our choice of the term, in this work we take a descriptive perspective and regard RPE as a construction of its own right, while leaving open the possibility that it can be assimilated to other types of ellipsis such as RNR or Gapping.

Introducing our main focus in this work, there has been considerable debate as to whether Korean RPE is subject to some sort of a tense identity condition (Chung 2005a; Ahn and Cho 2006; Park 2009; Kim and Cho 2012; Choi 2019). The debate centers around examples such as (2) below.

- (2) Mina-nun ecey, Jisu-nun nayil tochakha-l ke-ta.
 Mina-TOP yesterday Jisu-TOP tomorrow arrive-FUT KES.COP-DECL
 ‘Mina arrived yesterday and Jisu will arrive tomorrow.’

In this example, the two conjuncts are temporally *asymmetric*: the first conjunct includes the temporal adverb *ecey* ‘yesterday’, which triggers a past tense interpretation of the missing verb, whereas the second conjunct includes *nayil* ‘tomorrow’, which is compatible with a non-past tense context and thus naturally occurs with a verb affixed with a present or future tense marker. A main controversy has been on the legitimacy of sentences like (2). For example, Ahn and Cho (2006), Park (2009), and Kim and Cho (2012) assume that conjuncts in RPE need not match in tense, which predicts the acceptability of (2) under the intended asymmetric tense interpretation. On the other hand, Chung (2005a) and Choi (2019) argue that RPE does not permit asymmetric tense interpretations and therefore predict (2) to be unacceptable. Importantly, all these positions were based purely on informal judgments rather than empirical research. More recently, Kim and Park (2020) provided experimental data that show effects of temporal asymmetry in RPE, but the data were not conclusive enough to suggest a grammatical ban against temporal asymmetry. That is, the mean acceptability rating of sentences like (2) was 3.53 on a 7 point scale, which shows that such sentences are not completely rejected by native speakers of Korean.

Questions concerning the temporal interpretations of RPE have sometimes been discussed in connection with a related construction called bare *ko*-coordination (Choi 2003; Kim and Cho 2012). As shown in (3a), what is remarkable about bare *ko*-coordination is the asymmetry seen in the tense marking: the final conjunct is suffixed with a tense morpheme, whereas non-final conjuncts contain bare verbs lacking a tense

morpheme: e.g., *tochakha-ko* ‘arrive-and’. On the surface, this is a unique property of bare *ko*-coordination that sets it apart from ordinary full coordination, e.g., (3b).

- (3) a. Mina-nun ecey tochakha-ko, Jisu-nun nayil
 Mina-TOP yesterday arrive-and Jisu-TOP tomorrow
 tochakha-l ke-ta
 arrive-FUT KES.COP-DECL
 ‘Mina arrived yesterday and Jisu will arrive tomorrow.’
- b. Mina-nun ecey tochakha-yss-ko, Jisu-nun nayil
 Mina-TOP yesterday arrive-PST-and Jisu-TOP tomorrow
 tochakha-l ke-ta.
 arrive-FUT KES.COP-DECL
 ‘Mina arrived yesterday and Jisu will arrive tomorrow.’

Despite the absence of a tense morpheme, non-final conjuncts in bare *ko*-coordination are interpreted temporally; see for example the translation in (3a). This mismatch between the form and interpretation of bare *ko*-coordination is one of the reasons why the construction has attracted a number of scholars (Yoon 1996; Yoon 1997; Chung 2005b; Cho 2006; Lee and Tonhauser 2010). However, as of yet, no consensus has been made among these scholars on whether the construction is fully accepted by Korean speakers and how acceptable the construction is when a mismatched interpretation is targeted, as in (3a).

In this context, the present study aims to provide a more thorough investigation of temporal information in RPE and bare *ko*-coordination, focusing on native speakers’ acceptance of these constructions in the context of temporal mismatches. While most previous research has focused on theoretical investigations, we found it important to provide an empirical basis that can help understand whether Korean tenseless coordinate constructions exhibit sensitivity to different types of temporal mismatches, equally or differently. Another important goal of this study is to look into potential variation among speakers and try to explain the various informal judgments that have been reported in the theoretical literature.

The paper proceeds as follows. Section 2 introduces factors that have been reported to affect the acceptability of RPE and bare *ko*-coordination, restricting the discussion to matters concerned with temporal interpretations. Through this background discussion, we

attempt to highlight empirical gaps in previous research and motivate the experimental approach adopted in this study. Section 3 discusses the design and results of our experimental study, which aims to test the effects of different modes of temporal reference (symmetric vs. asymmetric) and temporal organization (sequential vs. reverse) on RPE and bare *ko*-coordination. General discussion on the results of the experiment is provided in Section 4, where we also attempt to shed light on variability in speaker judgments. Finally, Section 5 summarizes and concludes the paper.

2. Asymmetry of temporal reference and variation in the organization of time

As is well-known, Korean is a tensed language with a distinction between past and non-past tenses, and tense is encoded by means of verbal morphology (Sohn 1999). Main verbs in matrix clauses are obligatorily tensed in the language but with one exception: tense inflection is optional in non-final conjuncts of coordination marked by *-ko*. This is illustrated in (4) (modified from (1b) above).

- (4) Mina-nun sakwa-lul mek(-ess)-ko, Jisu-nun pay-lul
 Mina-TOP apple-ACC eat-PST-and Jisu-TOP pear-ACC
 mek-ess-ta.
 eat-PST-DECL
 ‘Mina ate apples and Jisu ate pears.’ (symmetric reading intended)

The version of this example without the past tense morpheme *-ess* exemplifies the bare *ko*-coordination construction. Somewhat surprisingly, the non-final conjunct in (4), even without the past tense morpheme, may receive a past tense interpretation according to which Mina’s eating apples is true at a time in the past that may or may not overlap with Jisu’s eating pears. That is, the two events described by the conjuncts may be interpreted with respect to the same temporal reference, say yesterday at 2 p.m., or they may be interpreted with respect to different temporal reference points, both of which are in the past of the time of utterance. In either interpretation, the temporal references of the conjuncts are a contextually-given interval of time prior to the time of utterance, hence called a *symmetric* interpretation.²

Earlier research claimed that the tense morpheme in the final conjunct determines the

temporal interpretations of both conjuncts in bare *ko*-coordination (Kang 1988; Park 1994; Yoon 1997). For example, in Yoon's (1997) analysis, the tense morpheme takes the entire coordinate structure as its complement, rather than being suffixed only to the final verb. This is illustrated in (5) below.

- (5) [[Mina-nun sakwa-lul mek-ko] [Jisu-nun pay-lul mek]]-ess-ta.
 Mina-TOP apple-ACC eat-and Jisu-TOP pear-ACC eat-PST-DECL
 'Mina ate apples and Jisu ate pears.'

In this analysis, the surface asymmetry in tense marking is an illusion, and both conjuncts are equally under the scope of the same tense morpheme, predicting only symmetric interpretations.

More recent studies, however, challenged this sort of 'tense-sharing' analysis. For instance, Chung (2005b) and Lee and Tonhauser (2010) argued that conjuncts in bare *ko*-coordination may receive an interpretation that is temporally *asymmetric*, as the temporal interpretation of a non-final conjunct is not constrained by the tense morpheme in the final conjunct. The following examples are introduced by Chung as acceptable ones and hence as evidence that asymmetric interpretations are possible in bare *ko*-coordination (2005b: 553, (7)).

- (6) a. motwu (ecey) yehayngttena-ko na-man honca (cikum)
 all yesterday trip-and I-only alone now
 cip-ul cikhi-n-ta.
 home-ACC keep-PRES-DECL
 'All others left on a trip yesterday and I am alone staying home now.'
- b. na-man honca (cikum) cip-ul cikhi-ko motwu (ecey)
 I-only alone now home-ACC keep-and all yesterday
 yehayngttena-ess-ta.
 trip-PST-DECL
 'I am alone staying home now and all others left on a trip yesterday.'

2 On the view that non-final conjuncts in bare *ko*-coordination can have a temporal interpretation that is independent from the tense morpheme in the final conjunct (Chung 2005b; Lee and Tonhauser 2010), (4) can also have an asymmetric interpretation in which the event time of the non-final conjunct overlaps with or follows the contextually given time of utterance.

Thus, there have been two different views on the status of bare *ko*-coordination with asymmetric temporal interpretations. Scholars such as Chung (2005b) and Lee and Tonhauser (2010) regard symmetric and asymmetric examples to be perfectly legitimate sentences in Korean, but others such as Kang (1988), Park (1994), and Yoon (1997) accept only symmetric examples. Despite this discrepancy, however, no previous research has systematically studied how the construction is received by naïve speakers, let alone attempt to examine possible factors that may influence speakers' judgments.

Besides (a)symmetry in temporal reference, another possible factor that should be noted regarding bare *ko*-coordination is the organization or progression of the conjuncts with respect to time. Scholars argued that conjuncts in bare *ko*-coordination can be presented in any temporal order without causing serious unacceptability (Chung 2005b, Lee and Tonhauser 2010). Note that (6a) and (6b) above are in sequential and reverse orders, respectively. It is unclear, however, whether both orders are equally accepted by native speakers. In an informal study we conducted, speakers reported that they found (6b) to be less acceptable than (6a). Since a key difference between these examples lies in the relative ordering between the conjuncts, it is plausible to suspect that temporal organization might be a factor affecting the acceptability of bare *ko*-coordination sentences. If it turns out to be so, then this might imply that bare *ko*-coordination is a context-dependent construction, most naturally suited to a narrative discourse (cf. Lee and Tonhauser (2010); see also Kehler (2000) for discussion on the *Narration* relation and ellipsis).³

The two factors discussed above, i.e., (a)symmetry in temporal reference and variation in temporal organization (sequential vs. reverse), need also be studied with RPE. As noted in Section 1, scholars disagree as to whether RPE permits temporal asymmetry between conjuncts. One group of scholars finds asymmetric examples to be more or less acceptable (Ahn and Cho 2006; Park 2009; Kim and Cho 2012), but there is also a group of scholars who do not accept such examples (Chung 2005a; Choi 2019). All these theoreticians seek to provide a formal analysis to explain what are and are not possible forms and interpretations of RPE sentences. However, we take it as a more important goal to study empirical issues first before one can begin a useful theoretical analysis. While the issue of temporal organization has not been discussed in the RPE literature,

3 We thank an anonymous reviewer for alerting us to the work of Kehler.

we find it worthwhile to study it and compare its influence on RPE and that on bare *ko*-coordination, as there has been a claim that some RPE sentences are reduced versions of bare *ko*-coordination (Choi 2003; Kim and Cho 2012), which predicts a similar acceptability profile of the two constructions. The experimental study we report below also tests this prediction, in the hopes of providing evidence that supports or counters different theories on the connection between RPE and bare *ko*-coordination.

3. Experiment

As alluded to above, speaker intuitions on RPE with temporal mismatches tend to vary a great deal. Furthermore, although Kim and Park (2020) showed that RPE is sensitive to mismatches of temporal reference, average ratings on temporally asymmetric sentences were not entirely low, which raises the suspicion that there might have been individual differences hidden behind what the average data can show. In our experimental study reported below, we conducted a comprehensive investigation of RPE and bare *ko*-coordination testing the potential factors discussed above. We aim to investigate speakers' acceptance of these constructions in the context of (i) symmetric or asymmetric temporal references and (ii) sequential or reverse temporal organizations of the conjuncts. The results of our experiment will provide empirical evidence for how RPE and bare *ko*-coordination are received by native speakers, whether speaker judgments are more or less uniform or diverse, and how the judgments are modulated by temporal reference and organization. The results will also provide theoretical implications for the analyses of RPE and ellipsis in general, as well as for providing preliminary data for a more thorough investigation of temporal interpretations in various coordinate constructions in Korean.

3.1 Methodology

Participants

A total of seventy-three native speakers of Korean, all university students in Korea, participated in the experiment. One participant, however, was eliminated due to excessive errors on the fillers. Upon completion of the experiment, each participant was compensated with a 5,000 KRW beverage gift card via a mobile message as a gratuity for their time and participation.

Design and Materials

A rating experiment was conducted to investigate possible factors that might affect the acceptability of different coordinate constructions: RPE, bare *ko*-coordination, and full coordination. The last construction, full coordination, was added as a baseline. The experiment targeted precisely those temporal aspects discussed in the previous studies on these constructions (see Section 2). A fully-crossed 2 x 2 x 3 factorial design was used, including one between-subjects factor (TEMPORAL REFERENCE) and two within-subjects factors (TEMPORAL ORGANIZATION and CONSTRUCTION TYPE). This meant that the experiment involved two groups of participants, one assigned only to the symmetric test items and the other only to the asymmetric test items. See Tables 1 and 2 for an overview of the experiment design.

Table 1. Factors and levels manipulated in the experiment

Factor	Levels
TEMPORAL REFERENCE (between-subjects)	symmetric, asymmetric
TEMPORAL ORGANIZATION (within-subjects)	sequential, reverse
CONSTRUCTION TYPE (within-subjects)	RPE, bare <i>ko</i> -coordination, full coordination

Table 2. Participant groups and conditions

	Group 1 TEMPORAL REFERENCE: asymmetric	Group 2 TEMPORAL REFERENCE: symmetric
Cond. 1	Sequential – RPE	Sequential – RPE
Cond. 2	Sequential – bare <i>ko</i> -coordination	Sequential – bare <i>ko</i> -coordination
Cond. 3	Sequential – full coordination	Sequential – full coordination
Cond. 4	Reverse – RPE	Reverse – RPE
Cond. 5	Reverse – bare <i>ko</i> -coordination	Reverse – bare <i>ko</i> -coordination
Cond. 6	Reverse – full coordination	Reverse – full coordination

For each level of the between-subjects factor (TEMPORAL REFERENCE: symmetric vs. asymmetric), two within-subjects factors were crossed to construct six different conditions: TEMPORAL ORGANIZATION (sequential vs. reverse) and CONSTRUCTION TYPE (RPE vs. bare *ko*-coordination vs. full coordination). TEMPORAL REFERENCE was manipulated by means of explicit expressions indicating a temporal reference such as *cinan tall/taum tal* ‘last month’/‘next month’ and TEMPORAL ORGANIZATION by differences between the order of conjuncts. As an

illustration, consider the following sample sets of stimuli.

(7) TEMPORAL REFERENCE: asymmetric

- a. Wonki-nun cinan tal-ey, Seju-nun taum tal-ey
 Wonki-TOP last month-in Seju-TOP next month-in
 mikwuk-ulo ttena-l kes-i-ta. (Asym-SeqRPE)
 America-for leave-FUT KES-COP-DECL
 ‘Wonki ~~left for America~~ last month and Seju will leave for America next month.’
- b. Wonki-nun cinan tal-ey mikwuk-ulo ttena-ko, Seju-nun
 Wonki-TOP last month-in America-for leave-and Seju-TOP
 taum tal-ey mikwuk-ulo ttena-l kes-i-ta. (Asym-SeqBareKo)
 next month-in America-for leave-FUT KES-COP-DECL
 ‘Wonki left for America last month and Seju will leave for America next month.’
- c. Wonki-nun cinan tal-ey mikwuk-ulo ttena-ss-ko, Seju-nun
 Wonki-TOP last month-in America-for leave-PST-and Seju-TOP
 taum tal-ey mikwuk-ulo ttena-l kes-i-ta. (Asym-SeqFull)
 next month-in America-for leave-FUT KES-COP-DECL
 ‘Wonki left for America last month and Seju will leave for America next month.’
- d. Seju-nun taum tal-ey, Wonki-nun cinan tal-ey
 Seju-TOP next month-in Wonki-TOP last month-in
 mikwuk-ulo ttena-ss-ta. (Asym-RevRPE)
 America-for leave-PST-DECL
 ‘Seju ~~will leave for America~~ next month and Wonki left for America last month.’
- e. Seju-nun taum tal-ey mikwuk-ulo ttena-ko, Wonki-nun
 Seju-TOP next month-in America-for leave-and Wonki-TOP
 cinan tal-ey mikwuk-ulo ttena-ss-ta. (Asym-RevBareKo)
 last month-in America-for leave-PST-DECL
 ‘Seju will leave for America next month and Wonki left for America last month.’
- f. Seju-nun taum tal-ey mikwuk-ulo ttena-l ke-ko,

Seju-TOP next month-in America-for leave-FUT KES.COP-and
 Wonki-nun cinan tal-ey mikwuk-ulo ttena-ss-ta. (Asym-RevFull)
 Wonki-TOP last month-in America-for leave-PST-DECL
 ‘Seju will leave for America next month and Wonki left for America last month.’

(8) TEMPORAL REFERENCE: symmetric

- a. Wonki-nun han tal twiey, Seju-nun twu tal twiey
 Wonki-TOP one month after Seju-TOP two month after
 mikwuk-ulo ttena-l kes-i-ta. (Sym-SeqRPE)
 America-for leave-FUT KES-COP-DECL
 ‘~~Wonki will leave for America~~ in one month and Seju will leave for America in two months.’
- b. Wonki-nun han tal twiey mikwuk-ulo ttena-ko, Seju-nun
 Wonki-TOP one month after America-for leave-and Seju-TOP
 twu tal twiey mikwuk-ulo ttena-l kes-i-ta. (Sym-SeqBareKo)
 two month after America-for leave-FUT KES-COP-DECL
 ‘Wonki will leave for America in one month and Seju will leave for America in two months.’
- c. Wonki-nun han tal twiey mikwuk-ulo ttena-l ke-ko,
 Wonki-TOP one month after America-for leave-FUT KES.COP-and
 Seju-nun twu tal twiey mikwuk-ulo ttena-l
 Seju-TOP two month after America-for leave-FUT
 kes-i-ta. (Sym-SeqFull)
 KES-COP-DECL
 ‘Wonki will leave for America in one month and Seju will leave for America in two months.’
- d. Seju-nun han tal ceney, Wonki-nun twu tal ceney
 Seju-TOP one month before Wonki-TOP two month before
 mikwuk-ulo ttena-ss-ta. (Sym-RevRPE)
 America-for leave-PST-DECL
 ‘~~Seju left for America~~ one month ago and Wonki left for America two months ago.’
- e. Seju-nun han tal ceney mikwuk-ulo ttena-ko, Wonki-nun
 Seju-TOP one month before America-for leave-and Wonki-TOP

twu tal ceney mikwuk-ulo ttena-ss-ta. (Sym-RevBareKo)
 two month before America-for leave-PST-DECL
 ‘Seju left for America one month ago and Wonki left for America two
 months ago.’

- f. Seju-nun han tal ceney mikwuk-ulo ttena-ss-ko, Wonki-nun
 Seju-TOP one month before America-for leave-PST-and Wonki-TOP
 twu tal ceney mikwuk-ulo ttena-ss-ta. (Sym-RevFull)
 two month before America-for leave-PST-DECL
 ‘Seju left for America one month ago and Wonki left for America two
 months ago.’

The examples in (7) and the ones in (8) differ in precisely one respect: the temporal expressions have asymmetric temporal references in the former while they have symmetric temporal references in the latter. Note that in each group of examples, (a)-(c) are sequentially ordered in that the event described in the first conjunct temporally precedes the event described in the second conjunct, while (d)-(f) are reversely ordered in that the event described in first conjunct temporally follows the event described in the second conjunct. These examples also show the manipulation of CONSTRUCTION TYPE: RPE ((a) and (d)), bare *ko*-coordination ((b) and (e)), and full coordination ((c) and (f)).

A total of 24 sets of six conditions (separately for the symmetric and asymmetric groups) were created following the patterns exemplified in (7) and (8) above.⁴ The resulting 144 test items (separately for the two groups) were counterbalanced to six distinct lists, employing a Latin Square design. Each list thus contained 24 test items, along with 48 fillers that were constant across the lists. Because the experiment involved a between-subject design, one half of the participants saw only asymmetric items and the other half saw only symmetric items.

Procedure

The experiment was conducted via the virtual conferencing platform called Zoom (<https://www.zoom.us>). Participants joined a Zoom meeting room owned by one of the authors at a scheduled time. They then followed a link to the experiment hosted on Ibex

4 The full list of test items is available in the following webpage:
https://www.researchgate.net/publication/351639034_AsymmetricSymmetric_test_items

Farm (Drummond 2013). While the experimenter and participant were looking at the same screen by using screen-share on Zoom, they went through the instruction and seven practice items so that the participant became familiar with the task. The experimenter then left the participant alone, letting her complete the experiment at her own speed and with privacy.

In the experiment, participants were shown a series of test and filler sentences presented in a pseudo-randomized order, and were asked to evaluate the acceptability of each sentence by pressing a number key between 1 (fully unacceptable) and 7 (fully acceptable) on the keyboard. When the participant pressed one of the seven keys, the next sentence was displayed on the screen. Upon completion of the experiment, the responses were recorded on the experimenter's Ixos Farm account automatically. On average, the experiment took about 10-15 minutes to complete.

3.2 Results

The mean acceptability ratings and standard error bars for the four conditions of each of the three construction types, i.e., RPE, bare *ko*-coordination, and full coordination, are shown in Figure 1 - Figure 3 below.

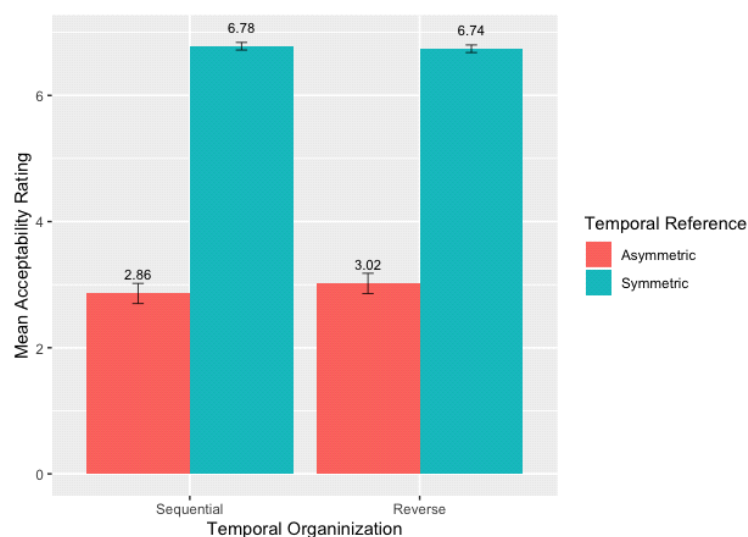


Figure 1. Mean acceptability ratings with standard error bars for the four conditions in RPE contexts

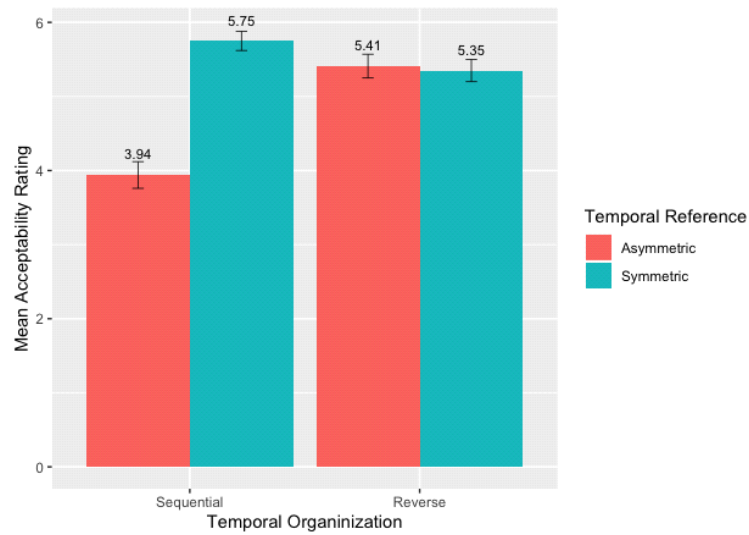


Figure 2. Mean acceptability ratings with standard error bars for the four conditions in bare *ko*-coordination contexts

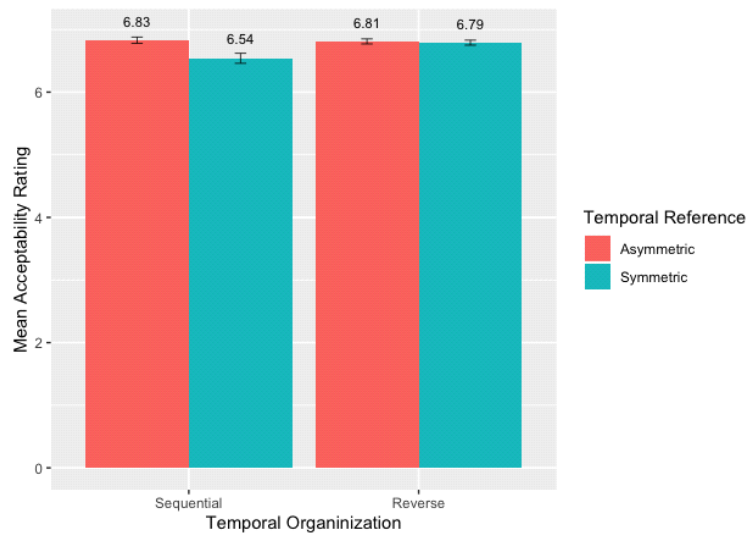


Figure 3. Mean acceptability ratings with standard error bars for the four conditions in full coordination contexts

Summarizing the descriptive results, the three different construction types show rather different mean acceptability rating distribution patterns with respect to TEMPORAL ORGANIZATION and TEMPORAL REFERENCE. For instance, in RPE contexts the mean acceptability ratings of symmetric items were higher than those of their asymmetric

counterparts (6.78 ($se = 0.06$) for Sym-SeqRPE > 2.86 ($se = 0.16$) for Asym-SeqRPE; 6.74 ($se = 0.06$) for Sym-RevRPE > 3.02 ($se = 0.16$) for Asym-RevRPE). On the other hand, in full coordination contexts the mean acceptability ratings of asymmetric items were not that different from those of their symmetric counterparts and the former were even slightly higher than the latter (6.83 ($se = 0.05$) for Asym-SeqFull > 6.54 ($se = 0.08$) for Sym-SeqFull; 6.81 ($se = 0.04$) for Asym-RevFull > 6.79 ($se = 0.04$) for Sym-RevFull). Meanwhile, in bare *ko*-coordination contexts the mean acceptability rating of symmetric items was much higher than that of asymmetric items with a sequential temporal organization (5.75 ($se = 0.13$) for Sym-SeqBareKo > 3.94 ($se = 0.18$) for Asym-SeqBareKo) while the mean acceptability rating of asymmetric items was slightly higher than that of symmetric items with a reverse temporal organization (5.41 ($se = 0.16$) for Asym-RevBareKo > 5.35 ($se = 0.15$) for Sym-RevBareKo).

Another observation we can make here concerns the mean acceptability ratings of the conditions that only differ in TEMPORAL ORGANIZATION across the three different constructions. That is, all the pairs have similar mean acceptability ratings, except for the one between Asym-SeqBareKo and Asym-RevBareKo (5.41 ($se = 0.16$) for Asym-RevBareKo > 3.94 ($se = 0.18$) for Asym-SeqBareKo).

Furthermore, if we look at the mean acceptability ratings of the conditions that only differ in CONSTRUCTION TYPE, in asymmetric temporal reference contexts the mean acceptability ratings of full coordination items were the highest and the mean acceptability ratings of RPE items were the lowest, with those of bare *ko*-coordination items in the middle (6.83 ($se = 0.05$) for Asym-SeqFull > 3.94 ($se = 0.18$) for Asym-SeqBareKo > 2.86 ($se = 0.16$) for Asym-SeqRPE; 6.81 ($se = 0.04$) for Asym-RevFull > 5.41 ($se = 0.16$) for Asym-RevBareKo > 3.02 ($se = 0.16$) for Asym-RevRPE). On the other hand, in symmetric temporal reference contexts the mean acceptability ratings of full coordination items and RPE items were similar and those of bare *ko*-coordination items were the lowest (6.78 ($se = 0.06$) for Sym-SeqRPE > 6.54 ($se = 0.08$) for Sym-SeqFull > 5.75 ($se = 0.13$) for Sym-SeqBareKo; 6.79 ($se = 0.04$) for Sym-RevFull > 6.74 ($se = 0.06$) for Sym-RevRPE > 5.35 ($se = 0.15$) for Sym-RevBareKo).

We performed a linear mixed-effects analysis of the acceptability ratings with TEMPORAL REFERENCE, TEMPORAL ORGANIZATION, and CONSTRUCTION TYPE as fixed effects and PARTICIPANT and ITEM as random effects in R (R Development Core Team 2018), via the *lmer* function in the *lme4* package (Bates et al.

2015). The p -values for fixed effects were calculated and obtained using the *lmerTest* package (Kuznetsova et al. 2017). Partial eta-squared values for effect sizes were extracted using the *sjstats* package (Lüdtke 2020).

From the analysis we found a significant main effect of TEMPORAL REFERENCE, $F(1, 74.677) = 66.2871, p < .001, \eta_p^2 = 0.47$, a significant main effect of TEMPORAL ORGANIZATION, $F(1, 266.513) = 11.6964, p < .001, \eta_p^2 = 0.04$, and a significant main effect of CONSTRUCTION TYPE, $F(2, 266.513) = 288.6791, p < .001, \eta_p^2 = 0.68$. We also found a significant main effect of the interaction between TEMPORAL REFERENCE and TEMPORAL ORGANIZATION, $F(1, 266.513) = 18.6359, p < .001, \eta_p^2 = 0.07$, a significant main effect of the interaction between TEMPORAL REFERENCE and CONSTRUCTION TYPE, $F(2, 266.513) = 290.0435, p < .001, \eta_p^2 = 0.69$, a significant main effect of the interaction between TEMPORAL ORGANIZATION and CONSTRUCTION TYPE, $F(2, 266.513) = 4.7889, p = 0.009, \eta_p^2 = 0.03$, and a significant main effect among TEMPORAL REFERENCE, TEMPORAL ORGANIZATION, and CONSTRUCTION TYPE, $F(2, 266.513) = 21.8215, p < .001, \eta_p^2 = 0.14$. In short, the three factors individually and their interactions all had significant main effects on the mean acceptability ratings of the test items.

To find out precisely where these significant differences stem from, we then conducted post-hoc pairwise comparisons using the R package *emmeans* (Lenth et al. 2018) with the Kenward-Roger approximation method for degrees of freedom and the Tukey method for p -value adjustments. We first report on the results of the post-hoc pairwise comparisons between TEMPORAL REFERENCE types by TEMPORAL ORGANIZATION and CONSTRUCTION TYPE in Table 3.

Table 3. Post-hoc pairwise comparisons between TEMPORAL REFERENCE types by TEMPORAL ORGANIZATION and CONSTRUCTION TYPE

Contrast	Estimate	SE	df	t.ratio	p-value
Asym-SeqRPE – Sym-SeqRPE	-3.9127	0.243	184	-16.120	< .0001
Asym-RevRPE – Sym-RevRPE	-3.7118	0.243	184	-15.292	< .0001
Asym-SeqBareKo – Sym-SeqBareKo	-1.8216	0.243	184	-7.505	< .0001
Asym-RevBareKo – Sym-RevBareKo	0.0533	0.243	184	0.219	0.8266
Asym-SeqFull – Sym-SeqFull	0.2862	0.243	184	1.179	0.2398
Asym-RevFull – Sym-RevFull	0.0154	0.243	184	0.063	0.9496

As Table 3 shows, the analysis revealed that asymmetric test items were rated

significantly lower than their symmetric counterparts in sequential and reverse RPE contexts (2.86 ($se = 0.16$) for Asym-SeqRPE vs. 6.78 ($se = 0.06$) for Sym-SeqRPE; 3.02 ($se = 0.16$) for Asym-RevRPE vs. 6.74 ($se = 0.06$) for Sym-RevRPE) and sequential bare *ko*-coordination contexts (3.94 ($se = 0.18$) for Asym-SeqBareKo vs. 5.75 ($se = 0.13$) Sym-SeqBareKo); however, they were not rated statistically differently in sequential and reverse full coordination contexts (6.83 ($se = 0.05$) for Asym-SeqFull vs. 6.54 ($se = 0.08$) for Sym-SeqFull; 6.81 ($se = 0.04$) for Asym-RevFull vs. 6.79 ($se = 0.04$) for Sym-RevFull) and reverse bare *ko*-coordination contexts (5.41 ($se = 0.16$) for Asym-RevBareKo vs. 5.35 ($se = 0.15$) for Sym-RevBareKo). The results here in turn indicate that TEMPORAL ORGANIZATION types had different impacts on asymmetric/symmetric pairs of bare *ko*-coordination contexts.

Next, consider the results of the post-hoc pairwise comparisons between TEMPORAL ORGANIZATION types by TEMPORAL REFERENCE and CONSTRUCTION TYPE in Table 4 below.

Table 4. Post-hoc pairwise comparisons between TEMPORAL ORGANIZATION types by TEMPORAL REFERENCE and CONSTRUCTION TYPE

Contrast	Estimate	SE	df	t.ratio	p-value
Asym-SeqRPE – Asym-RevRPE	-0.1593	0.171	264	-0.932	0.3522
Sym-SeqRPE – Sym-RevRPE	0.0417	0.171	264	0.244	0.8071
Asym-SeqBareKo – Asym-RevBareKo	-1.4790	0.171	264	-8.656	< .0001
Sym-SeqBareKo – Sym-RevBareKo	0.3958	0.171	264	2.322	0.0210
Asym-SeqFull – Asym-RevFull	0.0209	0.171	264	0.122	0.9029
Sym-SeqFull – Sym-RevFull	-0.2500	0.171	264	-1.466	0.1438

The analysis showed that test items with a sequential temporal organization were rated significantly lower than their counterparts with a reverse temporal organization in asymmetric bare *ko*-coordination contexts (3.94 ($se = 0.18$) for Asym-SeqBareKo vs. 5.41 ($se = 0.16$) for Asym-RevBareKo), but the reverse pattern was found in symmetric bare *ko*-coordination contexts (5.75 ($se = 0.13$) for Sym-SeqBareKo vs. 5.35 ($se = 0.15$) for Sym-RevBareKo); however, they were not rated significantly differently in asymmetric and symmetric RPE and full coordination contexts, respectively (2.86 ($se = 0.16$) for Asym-SeqRPE vs. 3.02 ($se = 0.16$) for Asym-RevRPE; 6.78 ($se = 0.06$) for Sym-SeqRPE vs. 6.74 ($se = 0.06$) for Sym-RevRPE; 6.83 ($se = 0.05$) for Asym-SeqFull vs. 6.81 ($se = 0.04$) for Asym-RevFull; 6.54 ($se = 0.08$) for Sym-SeqFull vs. 6.79 ($se = 0.04$) for Sym-RevFull).

Also, observe the results of the post-hoc pairwise comparisons between CONSTRUCTION TYPE types by TEMPORAL REFERENCE and TEMPORAL ORGANIZATION in Table 5.

Table 5. Post-hoc pairwise comparisons between CONSTRUCTION TYPE by TEMPORAL REFERENCE and TEMPORAL ORGANIZATION

Contrast	Estimate	SE	df	t.ratio	p-value
Asym-SeqRPE – Asym-SeqBareKo	-1.0634	0.171	264	-6.223	<. 0001
Asym-SeqRPE – Asym-SeqFull	-3.9629	0.171	264	-23.192	<. 0001
Asym-SeqBareKo – Asym-SeqFull	-2.8995	0.171	264	-16.969	<. 0001
Sym-SeqRPE – Sym-SeqBareKo	1.0278	0.171	264	6.028	<. 0001
Sym-SeqRPE – Sym-SeqFull	0.2361	0.171	264	1.385	0.3503
Sym-SeqBareKo – Sym-SeqFull	-0.7917	0.171	264	-4.643	<. 0001
Asym-RevRPE – Asym-RevBareKo	-2.3831	0.171	264	-13.945	<. 0001
Asym-RevRPE – Asym-RevFull	-3.7827	0.171	264	-22.135	<. 0001
Asym-RevBareKo – Asym-RevFull	-1.3996	0.171	264	-8.191	<. 0001
Sym-RevRPE – Sym-RevBareKo	1.3819	0.171	264	8.105	<. 0001
Sym-RevRPE – Sym-RevFull	-0.0556	0.171	264	-0.326	0.9432
Sym-RevBareKo – Sym-RevFull	-1.4375	0.171	264	-8.431	<. 0001

The analysis revealed that all the pairs had significant mean acceptability rating differences except for two: 1) between symmetric RPE items with a sequential temporal organization and symmetric full coordination items with a sequential temporal organization (6.78 ($se = 0.06$) for Sym-SeqRPE vs. 6.54 ($se = 0.08$) for Sym-SeqFull) and 2) symmetric RPE items with a reverse temporal organization and symmetric full coordination items with a reverse temporal organization (6.74 ($se = 0.06$) for Sym-RevRPE vs. 6.79 ($se = 0.04$) for Sym-RevFull).⁵

5 An anonymous reviewer asked why participants' responses had not been z-score transformed prior to statistical analysis. While we agree that z-score transformation is generally useful since it helps avoid some of the potential problems arising from scale bias of participants, care must be taken when using it with data from a between-subjects experiment, as there could be *item* bias. For example, for an experiment with a between-subjects factor like ours, the means of the two groups are likely to be different. Thus, we believed that statistical analysis for our experiment on the basis of z-transformed scores would mask clear results. Nevertheless, taking the reviewer's comment, we also performed a linear mixed-effects analysis of the z-transformed acceptability ratings with TEMPORAL REFERENCE, TEMPORAL ORGANIZATION, and CONSTRUCTION TYPE as fixed effects and PARTICIPANT and ITEM as random effects in R. The results, in general, show very similar patterns to the ones based on raw acceptability ratings reported in the current paper. The differences were only found with respect to three post-hoc pairwise comparisons between TEMPORAL REFERENCE types by TEMPORAL ORGANIZATION and CONSTRUCTION TYPE as in Table 3: Asym-RevBareKo – Sym-RevBareKo, Asym-SeqFull – Sym-SeqFull, and Asym-RevFull – Sym-RevFull. As opposed to the observations in Table 3, the z-transformed mean acceptability difference

4. General discussion

This paper investigated two types of tenseless coordinate constructions in Korean – RPE and bare *ko*-coordination – using a judgment paradigm which examined the acceptability of these constructions. We focused in particular on possible influences of two factors, namely TEMPORAL REFERENCE and TEMPORAL ORGANIZATION, on the acceptability of these constructions. Besides, the present study aimed at examining potential variation among speakers' judgments as a source of theorists' disagreement.

As discussed in detail in Sections 1 and 2, scholars disagree as to the potential influence of asymmetry of temporal reference on the acceptability of RPE (Chung 2005a; Ahn and Cho 2006; Park 2009; Kim and Cho 2012; Choi 2019). Taken at face value, the low mean acceptability ratings of asymmetric items from our experiment (2.86 for Asym-SeqRPE; 3.02 for Asym-RevRPE) as opposed to the symmetric ones (6.78 for Sym-SeqRPE; 6.74 for Sym-RevRPE) might be taken to suggest that mismatches in temporal reference have a severe negative effect on the acceptability of the RPE construction. This interpretation would be consistent with Choi (2019) and others' claim that RPE is grammatically restricted to temporally symmetric contexts, while rejecting the claim that asymmetric interpretations in RPE are fully acceptable (Ahn and Cho 2006; Park 2009; Kim and Cho 2012). Instead of immediately resorting to such a conclusion, we examined judgment data more thoroughly, looking for any signs of variability that would suggest that negative effects of asymmetric temporal reference are speaker-sensitive.

Figure 4 shows individual participants' mean acceptability ratings on RPE when the conjuncts mismatch in their temporal reference ($n = 36$). The distribution of the mean acceptability ratings shown in the figure suggests that the low acceptability ratings observed at the population level were not due consistently to temporal asymmetry effects but rather artifacts resulting from averaging across individual participant's data. The figure shows a high degree of inter-speaker variability, with mean acceptability ratings ranging from 1 to 6 or more. The distribution of individual participant's mean acceptability ratings also shows that, broadly speaking, there are two groups of

in each of these three pairs reached a statistical significance. We believe the reason behind this is the relatively high acceptability of symmetric test items, which created scale compression, i.e., a tendency of using higher points on the 7 point scale. We thank the anonymous reviewer for pointing out that a within-subject design would have helped prevent this potential issue.

participants in terms of their mean acceptability ratings: roughly half of the participants tended to reject RPE ($n = 19$) while the other half accepted or gave intermediate acceptability ratings ($n = 17$).

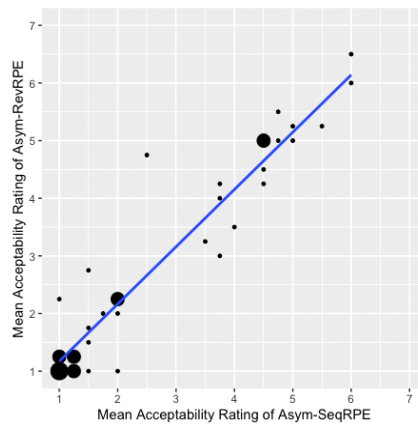


Figure 4. A scatter plot showing the mean acceptability ratings of temporally asymmetric RPE by participant (The biggest dot at the bottom-left corner indicates the average ratings of three participants, each smaller dot indicates the average ratings of two participants, and each smallest dot indicates the average rating of one participant.)

Another interesting result seen in Figure 4 is that participants were fairly consistent in their ratings of asymmetric RPE items across the two temporal organization types, i.e., sequential and reverse. The figure shows that there was a strong positive correlation between participants' mean acceptability ratings of sequential items and those of reverse items, such that increases in their mean acceptability ratings of RPE with the sequential temporal organization were correlated with increases in their mean acceptability ratings of RPE with the reverse temporal organization (the Pearson correlation coefficient $r = 0.95$). One might suspect that the mean acceptability rating differences across participants might indicate experimental noise, but this explanation is unlikely given how consistent participants were in giving judgment ratings across sequential and reverse items, and also given how many participants gave generally low and high mean acceptability ratings rather than intermediate ratings.

Our finding that there is a great deal of inter-speaker variability in the judgments of RPE in the context of asymmetric temporal reference provides an explanation for the inconsistent observations in the theoretical literature. We saw that there was a substantial portion of participants who rejected RPE with asymmetric temporal reference, but there

were also participants who accepted or somewhat tolerated such data. Given this finding, it is plausible that the conflicting observations by theoreticians studying RPE reflect the two participant groups discovered in the present study. At the same time, these results present a serious challenge to all existing theoretical analyses of RPE, which predict either complete acceptability or unacceptability of RPE with asymmetric temporal reference with ratings consistent across speakers. In order to provide a more successful account, these analyses need to be supplemented with a mechanism that can predict the observed variation across speakers.

The inter-speaker variation observed in the mean acceptability ratings of RPE data prompted us to look for such variability in the mean acceptability ratings of bare *ko*-coordination in the context of temporal asymmetry. An analysis of individual participants' responses also reveals that there is inter-speaker variation in the acceptance of the construction in the context of asymmetric temporal reference, although judgments were not as varied as they were with RPE sentences. As Figure 5 shows, on average, most participants gave ratings of more than 4 to bare *ko*-coordination stimuli when the construction had a reverse temporal organization. On the other hand, ratings for when the temporal organization was sequential show a great variability, with ratings from 1 to 7. This difference between sequential and reverse temporal organizations lead to a weaker correlation between their ratings, as indicated by the fitted line in the figure (the Pearson correlation coefficient $r = 0.45$).

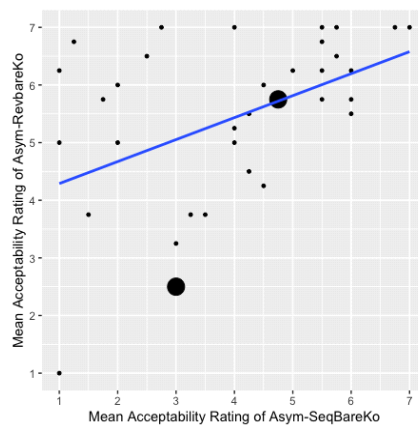


Figure 5. A scatter plot showing the mean acceptability ratings of temporally asymmetric bare *ko*-coordination by participant (Each big dot indicates the average rating of two participants and each small dot the average rating of one participant.)

As Figure 5 and the statistical analysis reported in Section 3.2 show, TEMPORAL ORGANIZATION seems to be a significant predictor of the acceptability of bare *ko*-coordination interacting with temporal reference: in the context of asymmetric temporal reference, acceptability of the construction improves significantly when it is presented in the reverse temporal order than in the sequential temporal order. The question then is why. For ease of discussion sentences (7e) and (7b) are repeated below as (9a) and (9b), respectively.

- (9) a. Seju-nun taum tal-ey mikwuk-ulo ttena-ko, Wonki-nun
 Seju-TOP next month-in America-for leave-and Wonki-TOP
 cinan tal-ey mikwuk-ulo ttena-ss-ta. (Asym-RevBareKo)
 last month-in America-for leave-PST-DECL
 ‘Seju will leave for America next month and Wonki left for America last month.’
- b. Wonki-nun cinan tal-ey mikwuk-ulo ttena-ko, Seju-nun
 Wonki-TOP last month-in America-for leave-and Seju-TOP
 taum tal-ey mikwuk-ulo ttena-l kes-i-ta. (Asym-SeqBareKo)
 next month-in America-for leave-FUT KES-COP-DECL
 ‘Wonki left for America last month and Seju will leave for America next month.’

One possible reason we suspect is the influence of tense encoding in non-final conjuncts on the overall processing of coordinate sentences. Even in full coordination, non-final conjuncts are zero-marked for tense when they describe a non-past event; markers of future events, such as *-ul kes*, contribute to further restricting the temporal reference of a non-past event but need not be present to indicate the non-past tense. This means that, for instance, comprehension of (9a) need not involve a recovery of a missing tense inflection since the sentence can be parsed as a full coordination sentence, not necessarily as a bare *ko*-coordination sentence. The non-final conjunct in (9b), by contrast, describes a past event. Because non-final conjuncts in full coordination necessarily contain an overt past tense morpheme when they describe a past event, the non-final conjunct in (9b) can only be parsed as bare *ko*-coordination with unspecified tense information. We preliminarily suspect that the relatively lower acceptability of stimuli such as (9b) in comparison to those such as (9a) can be attributed to this

asymmetry in the overt encoding of tense information and an extra cognitive effort involved in the comprehension of bare non-final conjuncts in the context of mixed cues, i.e., the past adverb in the non-final conjunct and the future tense morpheme in the final conjunct.

Our experimental study also sheds light on the existing debate about the ‘source structure’ of RPE. As mentioned in Section 2, some researchers claim that RPE sentences can be analyzed to have originated from bare *ko*-coordination structures (Choi 2003; Kim and Cho 2012). They also assume that RPE is immune to mismatches in temporal reference precisely because bare *ko*-coordination is so and because the two are related somehow. The fact that RPE shows a greater inter-speaker variability in the context of asymmetric temporal reference and that it tends to be more sensitive to temporal (a)symmetry than bare *ko*-coordination raises the possibility that these constructions are best treated separately rather than being analyzed to have originated from the same source structure.

The inter-speaker differences in the acceptability of RPE and bare *ko*-coordination we have observed raise a fundamental question of whether these variation data are best analyzed in terms of grammatical or extra-grammatical effects. Previous research suggested that inter-speaker variation in acceptability ratings might indicate different grammars for different subsets of participants (Adger 2006; den Dikken et al. 2007). Another possible explanation is that variation can be a sign that the prediction is disconfirmed (Hoji 2010), namely there is no grammatical constraint of (a)symmetry of temporal reference on RPE and bare *ko*-coordination whatsoever. Still another explanation can be provided in terms of constraint ranking or strength. It could be that Korean grammar includes constraints that prohibit mismatches of temporal reference in RPE and bare *ko*-coordination but that the constraints are violable rather than categorical (Sorace 2000; Keller 2001). Whether any of these explanations best accounts for a full array of empirical data obviously calls for further systematic investigation.

5. Conclusion

Coordinate structures in Korean may display a surface asymmetry in the presence or absence of tense inflection between the conjuncts, but in the interpretation the conjuncts are always interpreted temporally. In this paper, we investigated RPE and bare

ko-coordination by focusing on their acceptability in the context of (a)symmetry of temporal reference, while also taking into account the possible influence of the temporal organization of these constructions – i.e., whether the conjuncts are presented in a temporally sequential or reverse order. We found that these factors, as well as their interactions, are reliable predictors of the acceptability of RPE and bare *ko*-coordination. Our findings suggest that asymmetry of temporal reference greatly lowers the acceptability of RPE in general and that it also lowers the acceptability of bare *ko*-coordination when the conjuncts are presented in a temporally sequential order. We also found that speakers' acceptance of these constructions shows a high level of variability. These results clarify the nature of the empirical disputes that have been a major source of confusion in the theoretical literature and provide preliminary data for further experimental research.

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