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# The Temporal Interpretation of the Korean *-ko* Construction: Aktionsart and Discourse Context\*

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## Abstract

The temporal interpretation of the Korean *-ko* construction has been given analyses that assume a construction-specific mechanism (e.g. Yoon 1993, 1994, 1997; Chung 2001, 2005). This paper presents several empirical arguments against these analyses, and develops a compositional analysis. The main point of this paper is that the temporal interpretation of the *-ko* construction can be accounted for in terms of an independently motivated principle regarding the effect of Aktionsart and discourse context on temporal interpretations. Given that Aktionsart and discourse context also govern the temporal interpretation of Korean simple sentences in discourse, I conclude that no construction-specific mechanism is required for the temporal interpretation of the *-ko* construction.

## 1 Introduction

Korean main clauses bear the tense markers *-nun* (NPST) or *-ess* (PST). However, there are some clauses in Korean where tense morphemes are not obligatory. Nonfinal conjuncts in the *-ko* construction are a case in point as illustrated in (1)<sup>1</sup>:

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<sup>1</sup>In this paper, I use the following glosses: ACC (accusative case), DE (declarative), HON (honorific marker), KO (*-ko*), MOD (modal), NOM (nominative case), NPST (nonpast), PROG (progressive), PST (past), Q (interrogative), and TOP (topic marker).

- (1) John-i chwumchwu-(ess)-ko, Mary-ka nolayha-ess-t  
 John-NOM dance-PST-KO Mary-NOM sing-PST-DE  
 ‘John danced and Mary sang.’

The nonfinal conjunct of the *-ko* construction is interpreted as having a specific temporal reference despite the lack of a morphological marking. The temporal interpretation of such an untensed conjunct in the *-ko* construction is the central topic of this paper.

Previous studies have attempted to derive the temporal interpretation of the *-ko* construction by means of a construction-specific mechanism. Yoon (1993, 1994, 1997) proposes that the overt tense morpheme of a final conjunct undergoes affix-raising at LF. The affix-raising moves a tense morpheme to a structurally higher position in which it c-commands the nonfinal conjunct. This analysis predicts that two conjuncts are always interpreted as having the same temporal reference. However, as noted by Chung (2001, 2005), this is not the case. In (2), the eventuality of the nonfinal conjunct is interpreted to occur prior to the speech time even though that of the final conjunct is interpreted to occur at the speech time:<sup>2</sup>

- (2) John-i cinan hakki-ey nonmwun-ul ssu-ko,  
 John-NOM last semester-at thesis-ACC write-KO  
 onul machimnay colepha-nun-ta.  
 today finally graduate-NPST-DE  
 ‘John wrote a thesis last semester and finally he is graduating today.’

In order to account for the fact that this kind of asymmetric temporal interpretation is possible when a time adverbial occurs in the untensed conjunct, Chung (2001, 2005) proposes a phonologically null tense morpheme in the untensed conjunct. However, he does not spell out how the null tense morpheme is temporally interpreted when there is no time adverbial in the untensed conjunct.

This paper shows that Aktionsart and discourse context play a crucial role in the temporal interpretation of the *-ko* construction. They give rise to an implicature between the time intervals denoted by sentences. Based on this observation, I provide a compositional analysis of the *-ko* construction and show how the compositional meaning interacts with pragmatic factors. Given that Aktionsart and discourse context also govern the temporal interpretation of Korean simple sentences in discourse, I conclude that no construction-specific mechanism is required for the *-ko* construction to derive its temporal interpretation, contrary to the previous analyses.

<sup>2</sup>I use Bach’s (1981: 69) term ‘eventuality’ to cover all kinds of events and states.

## 2 Aktionsart and discourse context

This section discusses the effect of Aktionsart and discourse context on the temporal interpretation of sentences in narrative discourse.

### 2.1 The effect of Aktionsart on temporal interpretations

It has been pointed out that Aktionsart and discourse context give rise to an implicature of the temporal relation between two eventualities. The literature on temporal semantics has shown that this obtains for various languages such as English, French, and Spanish (Dowty (1986), Hinrichs (1986), Partee (1984) for English; Kamp and Rohrer (1983) for French; Cipria and Roberts (2000) for Spanish among others). The relevant semantic notion for this implicature is telicity, which is defined in terms of the subinterval property. Atelic sentences (i.e. states and activities) have the subinterval property whereas telic sentences (i.e. accomplishments and achievements) do not have it. Dowty (1986: 42) characterizes them as below:

- (3)
- a. A sentence  $\Phi$  is **stative** iff it follows from the truth of  $\Phi$  at an interval  $I$  that  $\Phi$  is true at all subintervals of  $I$ .  
(e.g. if John was asleep from 1:00 until 2:00 pm, then he was asleep at all subintervals of this interval: *be asleep* is a stative.)
  - b. A sentence  $\Phi$  is an **activity** iff it follows from the truth of  $\Phi$  at an interval  $I$  that  $\Phi$  is true of all subintervals of  $I$  down to a certain limit in size.  
(e.g. if John walked from 1:00 until 2:00 pm, then most subintervals of this time are times at which John walked; *walk* is an activity.)
  - c. A sentence  $\Phi$  is an **accomplishment/achievement** iff it follows from the truth of  $\Phi$  at an interval  $I$  that is false at all subintervals of  $I$ .  
(e.g. if John built a house in exactly the interval from September 1 until June 1, then it is false that he built a house in any subinterval of this interval: *build a house* is an accomplishment/achievement.)

Dowty (1986) argues that the temporal interpretation in narrative discourse can be accounted for in terms of this subinterval property of an atelic Aktionsart. It gives rise to an implicature such that the atelic proposition is actually true at a larger interval properly including its event time. Due to this potential of an atelic Aktionsart expanding to a superinterval, a temporal overlap with an adjacent sentence is implicated in discourse as in (4a-b). Two successive telic sentences are implicated to be sequentially ordered in discourse as in (4c-d).

- (4)
- a. John entered the president's office. The president sat behind a huge desk.
  - b. John entered the president's office. The clock on the wall ticked loudly.
  - c. John entered the president's office. The president walked over to him.
  - d. John entered the president's office. The president woke up.

(Dowty 1986: 38-39)

These implicatures can be cancelled by discourse context (including world knowledge). For example, the atelic eventuality  $e_4$  does not overlap with the adjacent eventuality  $e_3$  in (5) since the former is the resulting state of the latter.

- (5) Jameson entered the room ( $e_1$ ), shut the door carefully ( $e_2$ ), and switched off the light ( $e_3$ ). It was pitch dark around him ( $e_4$ ), because the Venetian blinds were closed ( $e_5$ ). (Partee 1984: 254)

## 2.2 The effect of Aktionsart on the temporal interpretation of Korean simple sentences

The implicatures discussed in the preceding section also arise in sequences of Korean simple sentences in discourse. In her corpus study, E-H. Lee (2007) notes that the Aktionsart of the main predicate contributes to a narrative progression in Korean past tensed sentences in such a way that event descriptions advance the narrative time forward whereas statives do not.

E-H. Lee (2007) utilizes the distinction between events and statives as a criterion for the narrative progression. However, activities do not necessarily lead to the narrative progression. They also allow for overlapping readings between two eventualities (namely, not triggering a narrative progression) as statives. (6a) illustrates the temporal overlap between two activities, and (6b) illustrates the temporal overlap between two statives.

- (6) a. John-i            chwumchwu-ess-ta.    Mary-nun            nolayha-ess-ta.  
       John-NOM        dance-PST-DE        Mary-TOP            sing-PST-DE  
       ‘John danced. Mary sang.’
- b. Nal-i            chwu-ess-ta.            Pi-ka                nayri-ess-ta.  
       Day-NOM        be.cold-PST-DE        Rain-NOM            fall-PST-DE  
       ‘It was cold. It rained.’

Now, given the fact that activities exhibit the same effect on the narrative progression as statives, the narrative progression should be attributed to telic Aktionsarten (i.e. accomplishments and achievements), not to events (which include activities as well as accomplishments/achievements). Such an effect of atelic Aktionsarten on the narrative discourse is exactly what is predicted by their subinterval property as noted by Dowty (1986). For example, the precedence relation is implicated by successive telic sentences as in (7), where the first and second propositions are an accomplishment and an achievement, respectively. By contrast, the occurrence of an atelic sentence gives rise to an implicature of temporal overlap with a preceding sentence as illustrated in (6), where the two propositions are activities or statives.

- (7) John-i nonmwun-ul ssu-ess-ta. Machimnay colepha-ess-ta.  
 John-NOM thesis-ACC write-PST-DE finally graduate-PST-DE  
 ‘John wrote a thesis. Finally he graduated.’

These implicatures are heavily context dependent in Korean just like in other languages. In a specific context, (6a) can also receive a precedence interpretation as in (8):

- (8) [Context: John and Mary are participating in a competition. Each artist performs separately.]  
 John-i chwumchwu-ess-ta. Mary-nun nolayha-ess-ta.  
 John-NOM dance-PST-DE Mary-TOP sing-PST-DE  
 ‘John danced. Mary sang.’

### 2.3. The effect of Aktionsart on the temporal interpretation of the *-ko* construction

The realization of post-verbal suffixes in the *-ko* construction differs from that in its corresponding simple sentences; (i) the *-ko* marked clause cannot bear a mood marker, and (ii) a tense morpheme is realized optionally as shown below<sup>3</sup>:

- (9) John-i chwumchwu-(ess)-(\*ta)-ko, Mary-ka nolayha-ess-ta.  
 John-NOM dance-PST-DE-KO Mary-NOM sing-PST-DE  
 ‘John danced and Mary sang.’

Despite this difference, the temporal interpretation available for (9) is exactly the same as its corresponding simple sentences given in (6a). The two atelic propositions give rise to an overlapping reading between the two eventualities by default, but it is also cancellable given a specific discourse context. For example, if the preceding discourse says that John and Mary did the performance together, (9) receives the default overlapping interpretation, but if the same contextual information as (8) is given, (9) receives a precedence interpretation.

<sup>3</sup>There are various post-verbal suffixes in Korean (e.g. a progressive marker *-koiss*, a modal *-keyss*, an honorific marker *-si*), which are optionally realized in the main clauses as illustrated below:

- (i) John-i chwumchwu-koiss-\*(ess)-keyss-\*(ta).  
 John-NOM dance-HON-PROG-PST-MOD-DE  
 ‘John might have been dancing.’

For the sake of simplicity, I take into account the *-ko* sentences whose final conjunct contains only two obligatory post-verbal suffixes, namely, a tense morpheme and a mood marker. However, the more complicated examples containing the optional suffixes can also be accounted for under my analysis in exactly the same way as the simple cases.

World knowledge is also relevant for these implicatures. In (10a), the overlapping reading arising from two atelic propositions is cancelled by world knowledge because a man cannot perform the two activities of riding a bike and flying at the same time. However, the overlapping reading is available if the individual that performs the activities is E.T., as in (10b):

- (10) a. Ku namca-nun cacenke-lul tha-ko, pihang-ul ha-ess-ta.  
 the man-TOP bike-ACC ride-KO, flight-ACC do-PST-DE  
 ‘The man rode a bike and flew.’ [Precedence interpretation]
- b. [Context: after watching the ending scene of the movie E.T.]  
 E.T-ka cacenke-lul tha-ko, pihang-ul ha-ess-ta.  
 E.T-NOM bike-ACC ride-KO, flight-ACC do-PST-DE  
 ‘E.T rode a bike and flew.’ [Overlapping interpretation]

In the next section, I present an analysis that incorporates these findings on the temporal interpretation of the *-ko* construction.

### 3 A compositional analysis and discourse principle

Section 3.1 analyzes the temporal interpretation of simple sentences. The analysis of the *-ko* construction is presented in section 3.2.

#### 3.1 Simple sentences in Korean

This section shows how to derive the temporal interpretations of the two successive sentences in (6), which are repeated with contextual information in (11):

- (11) [Context: John and Mary participated in a couple’s contest.]  
 John-i chwumchwu-ess-ta. Mary-nun nolayha-ess-ta.  
 John-NOM dance-PST-DE. Mary-TOP sing-PST-DE.  
 ‘John danced. Mary sang.’

##### 3.1.1 Syntax and semantics of simple sentences

I formulate my analysis in Combinatorial Category Grammar (CCG). The lexicon required for analyzing (11) is given in (12).<sup>4</sup> The abbreviations used for each syntactic category are as follows: NP<sub>nom</sub> (nominative NP), S (sentence), S<sub>-t</sub> (untensed sentence) and S<sub>+t</sub> (tensed sentence).<sup>5,6</sup>

<sup>4</sup>The formula  $AT(t, \Phi)$  means as follows:  $\Phi$  is true at  $t$  (Dowty 1979: 324).

<sup>5</sup>The denotational meanings of case markers and the topic marker are simplified in (12).

<sup>6</sup>A sentence that lacks a tense morpheme is of syntactic category S<sub>-t</sub> whereas a sentence to which the overt tense morpheme is attached is of syntactic category S<sub>+t</sub>. A sentence that has a mood marker (and thus can

- (12) a. *John*  $\vdash$  NP: John'  
 b. *Mary*  $\vdash$  NP: Mary'  
 c. *-i* (nominative case marker)  $\vdash$  NP<sub>nom}\NP :  $\lambda x[x]$   
 d. *-nun* (topic marker)  $\vdash$  NP<sub>nom}\NP :  $\lambda x[x]$   
 e. *chwumchwu-* 'dance'  $\vdash$  S<sub>-t}\NP<sub>nom</sub> :  $\lambda x\lambda t[AT(t, \text{dance}'(x))]$   
 f. *nolayha-* 'sing'  $\vdash$  S<sub>-t}\NP<sub>nom</sub> :  $\lambda x\lambda t[AT(t, \text{sing}'(x))]$   
 g. *-ess* (past tense morpheme)  $\vdash$  S<sub>+t}\S<sub>-t</sub> :  $\lambda P\lambda t[P(t) \wedge t < \text{now}]$   
 h. *-ta* (declarative marker)  $\vdash$  S\S<sub>+t</sub> :  $\lambda P[P(t)]$</sub></sub></sub></sub></sub>

where  $t$  is a variable of type  $i$  and  $P$  is a variable of type  $\langle i, t \rangle$  (denoting a set of time intervals (i.e. Stump's (1985) temporal abstract)).

As shown in (12), I assume that a Korean tense morpheme is of semantic type  $\langle \langle i, t \rangle, \langle i, t \rangle \rangle$  following Stump's (1985) analysis of English tense morphemes.<sup>7, 8</sup> It takes an untensed sentence (of type  $\langle i, t \rangle$ ) and produces a tensed sentence (of type  $\langle i, t \rangle$ ).<sup>9</sup> In other words, a tense morpheme does not change the semantic type of the expression that it combines with, but it just adds further specifications on the temporal relation between the event time and the speech time. For example, the past tense *-ess* specifies that the event time precedes the speech time (i.e.  $t < \text{now}$ ) as given in (12).

The combinatory rule required for analyzing (11) is Function Application (FA).<sup>10</sup> It is a basic operation to combine a functor with its argument. The definitions of two types of FAs, Forward FA and Backward FA, are given in (13):

- (13) a.  $Y/X: f \quad X: a \quad \vdash \quad Y: f(a) \quad$  [Forward FA]  
 b.  $X: a \quad Y \setminus X: f \quad \vdash \quad Y: f(a) \quad$  [Backward FA]

Now, based on the lexical specifications in (12) and the Function Application rule in (13), the syntax and semantics of (11) can be derived as follows:

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stand alone as an independent sentence) is of syntactic category S. Notice that S<sub>-t</sub> and S<sub>+t</sub> are defined in terms of the realization of a tense, and S is defined in terms of the realization of a mood marker.

<sup>7</sup>See Yoo (1996) for an analysis of Korean tense morphemes (*-ess* and *-nun*) in terms of a temporal abstract; see J. Lee (2007) for further discussion of Korean tense morphemes.

<sup>8</sup>Korean is known to have a relative tense system (e.g. Yoon 1996), but such meanings of tense morphemes are simplified here.

<sup>9</sup>Although tensed sentences and untensed sentences are of the same semantic type  $\langle i, t \rangle$ , a syntactic feature [ $\pm$  tensed] prevents ungrammatical sentences such as: (i) untensed main sentences, (ii) coordinate sentences in which a final conjunct is untensed, and (iii) sentences in which more than one tense morpheme is attached to the verb as in (i):

- (i) \* John-i            nolayha-nun-nun-ta.  
       John-NOM        sing-NPST-NPST-DE

<sup>10</sup>See Steedman (1996, 2000) for a more detailed introduction to CCG.

(14)	John-i John-NOM NP <sub>nom</sub> : John'	chwumchwu dance S <sub>-i</sub> \NP <sub>nom</sub> : $\lambda x \lambda t [AT(t, dance'(x))]$	-ess PST (S <sub>+t</sub> \S <sub>-i</sub> ) : $\lambda P \lambda t [P(t) \wedge t < now]$	-ta. DE (S\S <sub>+t</sub> ) : $\lambda P [P(t)]$
		FA		
		S <sub>-t</sub> : $\lambda t [AT(t, dance'(John'))]$		
		FA		
		S <sub>+t</sub> : $\lambda t [AT(t, dance'(John')) \wedge t < now]$		
		FA		
		S: $AT(t, dance'(John')) \wedge t < now$		

In (14), the one-place predicate *chwumchwu* ‘dance’ (of type  $\langle e, \langle i, t \rangle \rangle$ ) first combines with the subject NP *John-i* ‘John-NOM’ (of type  $e$ ) via Function Application, and produces an untensed sentence (of type  $\langle i, t \rangle$ ). The untensed sentence combines with the past tense morpheme *-ess* (of type  $\langle \langle i, t \rangle, \langle i, t \rangle \rangle$ ) again via Function Application, and a tensed sentence (of type  $\langle i, t \rangle$ ) is produced. Finally, the declarative marker *-ta* (of type  $\langle \langle i, t \rangle, t \rangle$ ) takes the tensed sentence (of type  $\langle i, t \rangle$ ), and produces an independent sentence (of type  $t$ ).

In exactly the same way, we can also derive the compositional meaning of the second sentence of (11). The compositional meanings of the two sentences in (11) are given below:

- (15) a.  $AT(t_1, dance'(John')) \wedge t_1 < now$   
 b.  $AT(t_2, sing'(Mary')) \wedge t_2 < now$

I assume that the locations of the two time intervals in (15) and their temporal relations are determined in discourse as discussed below.

### 3.1.2 The temporal interpretation of simple sentences in discourse

Dowty (1986:45) proposes the Temporal Discourse Interpretation Principle (TDIP) for a sequence of English sentences in discourse. Based on Reichenbach’s (1947) notion of reference time, Dowty (1986) assumes that each sentence has a separate reference time, and that it progresses in a narrative discourse. In his analysis, sentences are always sequentially ordered, but the inference from the subinterval property of atelic Aktionsarten gives rises to temporal overlap between two eventualities given contextual information.

Building on his insight, I reformulate the principle in accordance with my compositional analysis of Korean simple sentences and the *-ko* construction. As presented in the preceding section, the proposed compositional analysis does not use the notion of



reference time unlike in Dowty (1986).<sup>11</sup> I assume that only the event time of each sentence and the speech time are reflected in the compositional semantics (e.g. Stump 1985), and the temporal relation between two event times is implicated by Aktionsart and discourse context. In what follows, I present the discourse principle that does not introduce a reference time, but utilizes only the event time.<sup>12</sup>

- (16) Given a sequence of sentences  $S_1, S_2, \dots, S_n$  occurring in a narrative discourse, the event time  $t_i$  of the sentence  $S_i$  (for  $i$  such that  $1 < i \leq n$ ) is interpreted:
- a. at a time denoted by time adverbials in  $S_i$ , if there are any;
  - b. otherwise, by default
    - (i) as overlapping with the event time  $t_{i-1}$  of the sentence  $S_{i-1}$  if either  $S_{i-1}$  or  $S_i$  is atelic, or
    - (ii) as following the event time  $t_{i-1}$  of the sentence  $S_{i-1}$  if both  $S_{i-1}$  and  $S_i$  are telic.

Given this principle, the two event times of (15),  $t_1$  and  $t_2$ , are implicated to overlap.

Following the treatment of tenses in dynamic semantics (Kamp and Rohrer 1983, Partee 1984, Hinrichs 1986 among others), the time intervals are assumed to be bound in discourse.

- (17)  $\exists t_1 \exists t_2 [[AT(t_1, \text{dance}'(\text{John}')) \wedge t_1 < \text{now}]$   
 $\wedge [AT(t_2, \text{sing}'(\text{Mary}')) \wedge t_2 < \text{now}] \wedge [t_1 \circ t_2]]$

<sup>11</sup>For an analysis utilizing the notion of reference time, see E-H. Lee's (2007) analysis of Korean past-tensed sentences in discourse.

<sup>12</sup>Rather than making a direct reference to the telicity of sentences as in (16), one might prefer to establish a principle that utilizes the subinterval property of atelic sentences as follows:

- (i) Given a sequence of sentences  $S_1, S_2, \dots, S_n$  occurring in a narrative discourse, the event time  $t_i$  of the sentence  $S_i$  (for  $i$  such that  $1 < i \leq n$ ) is interpreted as following the event time  $t_{i-1}$  of the sentence  $S_{i-1}$ . However, if  $S_{i-1}$  or  $S_i$  is atelic, temporal overlap between  $t_{i-1}$  and  $t_i$  is implicated in discourse due to the inference from the subinterval property.

In terms of the effect of Aktionsart and discourse context, this principle is not inconsistent with (16). The way of establishing the principle like (16) is more like Bohnemeyer's (1998, 2002) approach to Yucatec Maya in which the two possible temporal relations (i.e. overlapping and precedence) are equivalently treated in two different principles (i.e. Perfective Principle and Imperfective Principle). By contrast, the principle in (i) is more similar to Dowty's (1986) approach to English sentences in that every sentence is sequentially ordered but the inference from the subinterval property of atelic Aktionsarten gives rise to the implicature of temporal overlap. These two possible ways of establishing a discourse principle do not make any differences in predicting the temporal interpretation of Korean sentences.

### 3.2 The *-ko* construction

This section shows that the temporal interpretation of the *-ko* construction can be accounted for in terms of the discourse principle in exactly the same way as the temporal interpretation of two simple sentences in discourse. I argue that there is no need to introduce a construction-specific mechanism for the *-ko* construction contra previous analyses (such as affix-raising and a null tense morpheme). The *-ko* construction that corresponds to the two simple sentences in (11) is analyzed in this section. It is given below:

- (18) [Context: John and Mary participated in a couples contest.]  
 John-i chwumchwu-ko, Mary-ka nolayha-ess-ta.  
 John-NOM dance-KO Mary-NOM sing-PST-DE  
 ‘John danced and Mary sang.’

#### 3.2.1 Syntax and semantics of the *-ko* construction

Given the lexicon in (12), (18) requires only one additional lexical specification, namely that for *-ko*.

In the *-ko* construction, the overt tense morpheme of the final conjunct does not scope over both conjuncts as discussed in the examples like (2). However, the mood marker is interpreted to scope over the whole sentence as exemplified below:

- (19) [[[ John-i chwumchwu ] -ko], [[ Mary-ka nolayha ] -ess] -ni]?  
 John-NOM dance -KO Mary-NOM sing -PST -Q  
 ‘Did John dance and Mary sing?’

In (19), the whole sentence is interpreted to have an interrogative mood by the occurrence of the interrogative marker *-ni*. Thus, the mood marker should not be analyzed as contained in the constituent conjoined by *-ko* (whereas the tense morpheme should be analyzed as included in the constituent conjoined by *-ko*).

In other words, the conjunction *-ko* conjoins a tensed or untensed sentence (occurring in the first conjunct) and a tensed sentence (occurring in the second conjunct). This different pattern of the tense realization in each conjunct can be captured by a syntactic feature [ $\pm$ tensed] as suggested by Kang (1988)<sup>13</sup>; *-ko* combines with  $S_{\pm t}$  (which is of

<sup>13</sup>Even though Kang (1988) utilizes the feature [ $\pm$ tensed] for the syntactic category S, his analysis of the *-ko* construction differs from my analysis in that (i) he assumes that the overt tense morpheme of the final conjunct scopes over the whole sentence, and (ii) he does not adopt Stump’s (1985) temporal abstract system. As noted by Chung (2001, 2005) and discussed above, (i) is not a correct generalization. Regarding (ii), section 4 shows that adopting Stump’s view is very crucial for understanding the temporal interpretation of the *-ko* construction.

type  $\langle i, t \rangle$  and produces a *-ko* marked clause. The *-ko* marked sentence is of syntactic category  $S_{+t}/S_{+t}$  and is of type  $\langle \langle i, t \rangle, \langle i, t \rangle \rangle$  since it combines with  $S_{+t}$  and produces  $S_{+t}$ . Given that *-ko* combines with  $S_{\pm t}$  and produces  $S_{+t}/S_{+t}$ , its syntactic category should be  $(S_{+t}/S_{+t}) \setminus S_{\pm t}$  and its semantic type should correspondingly be  $\langle \langle i, t \rangle, \langle \langle i, t \rangle, \langle i, t \rangle \rangle \rangle$ .

Following Dowty's (1986:57) insight on English conjunction *and*, I assume that *-ko* is a simple conjunction which does not specify any particular temporal relations between the conjuncts in its lexical meaning (contra Sohn 1999, Cho 2005 for the Korean conjunction *-ko*, and contra Txurruga 2003 for the English conjunction *and*). Based on the data we have observed in the preceding sections, I adopt the view that the temporal relation between eventualities is implicated by the independently motivated discourse principle given in (16). The lexical specification of *-ko* is given in (20). Notice that the temporal variable  $t_1$  denoting the event time of the first conjunct is a free variable (that gets bound only at the discourse level).

- (20) *ko* 'and'  $\vdash (S_{+t}/S_{+t}) \setminus S_{\pm t} : \lambda P \lambda Q \lambda t_2 [P(t_1) \wedge Q(t_2)]$   
 where  $P$  and  $Q$  are variables of type  $\langle i, t \rangle$ , and  $t_1$  and  $t_2$  are variables of type  $i$ .

With this lexical specification of *-ko* and those of other expressions given in (12), the syntax and semantics of the *-ko* construction can be derived as in (21). Here again, FA is the only necessary rule for analyzing the *-ko* construction as is the case for a simple sentence.

- (21)
- |   |  |  |                        |
|---|--|--|------------------------|
| John-i  | chwumchwu                                  | -ko,   |                        |
| J-NOM   | dance                                      | KO   |                        |
| NP <sub>nom</sub>   | $S_{-t} \setminus NP_{nom}$                | $(S_{+t}/S_{+t}) \setminus S_{\pm t}$                      |                        |
| : John'   | : $\lambda x \lambda t [AT(t, dance'(x))]$ | : $\lambda P \lambda Q \lambda t_2 [P(t_1) \wedge Q(t_2)]$ |                        |
| FA  |  |  |                        |
| $S_{-t} : \lambda t [AT(t, dance'(John'))]$   |  |  |                        |
| FA  |  |  |                        |
| $S_{+t}/S_{+t} : \lambda Q \lambda t_2 [AT(t_1, dance'(John')) \wedge Q(t_2)]$                |  |  |                        |
|   |  |  |                        |
| Mary-ka   | nolayha                                    | -ess   | -ta.                   |
| M-NOM   | sing                                       | -PST   | -DE                    |
| NP <sub>nom</sub>   | $(S_{-t} \setminus NP_{nom})$              | $(S_{+t} \setminus S_{-t})$                                | $(S \setminus S_{+t})$ |
| : Mary'   | : $\lambda x \lambda t [AT(t, sing'(x))]$  | : $\lambda P \lambda t [P(t) \wedge t < \text{now}]$       | : $\lambda P [P(t)]$   |
| FA  |  |  |                        |
| $S_{-t} : \lambda t [AT(t, sing'(M'))]$   |  |  |                        |
| FA  |  |  |                        |
| $S_{+t} : \lambda t' [AT(t', sing'(M')) \wedge t' < \text{now}]$                              |  |  |                        |
| FA  |  |  |                        |
| $S_{+t} : \lambda t_2 [AT(t_1, dance'(J)) \wedge AT(t_2, sing'(M')) \wedge t_2 < \text{now}]$ |  |  |                        |
| FA  |  |  |                        |
| $S : [AT(t_1, dance'(J)) \wedge AT(t_2, sing'(M')) \wedge t_2 < \text{now}]$                  |  |  |                        |

I assume that as in simple sentences, the temporal relation between the two event times  $t_1$  and  $t_2$  in (21) is determined in the discourse. They are also existentially bound in the discourse.

### 3.2.2 The temporal interpretation of the *-ko* construction in discourse

The discourse principle (16b) that pertains to the temporal relation between two successive sentences is also applicable to the *-ko* construction. According to (16),  $t_1$  in (21) is implicated to overlap with  $t_2$  since (21) consists of two atelic sentences.

Finally, existential quantification takes place at the discourse level as in a sequence of simple sentences. The temporal interpretation of (18) is given below:

$$(22) \quad \exists t_1 \exists t_2 [AT(t_1, \text{dance}'(J)) \wedge AT(t_2, \text{sing}'(M)) \wedge (t_2 < \text{now}) \wedge (t_1 \circ t_2)]$$

By the implicature of the temporal relation between two time intervals, the event time of the untensed conjunct is temporally interpreted to overlap with the event time of the final conjunct. As a result, the event of John's dancing in (22a) is interpreted to occur in the past with respect to the speech time.

The temporal interpretation of the *-ko* construction consisting of two telic sentences is also enriched in discourse. According to the discourse principle (16), if the *-ko* construction consists of two telic sentences as in (23), the two eventualities are implicated to be sequentially ordered.

- (23) a. John-i nonmwun-ul ssu-ko, machimnay colepha-nun-ta.  
 John-NOM thesis-ACC write-KO finally graduate-NPST-DE  
 'John wrote a thesis and finally he is graduating.'  
 b.  $\exists t_1 \exists t_2 [AT(t_1, \text{write-a-thesis}'(J)) \wedge AT(t_2, \text{graduate}'(J)) \wedge (t_2 \circ \text{now}) \wedge (t_1 < t_2)]$

By this implicature, the event time of the untensed conjunct is temporally interpreted to precede that of the final conjunct. Consequently, in (23), the event of John's writing a thesis is implicated to occur in the past relative to the speech time.

### 3.3 Summary

In the preceding section, I showed how the compositional meaning of the *-ko* construction interacts with the independently motivated principle regarding Aktionsart and discourse context. The temporal relation between the event times of two adjacent sentences is compositionally underspecified, but it is implicated in discourse. Such implicatures determine the temporal location of the event time of the untensed conjunct in the *-ko* construction.

This provides a simpler and more elegant account of the temporal interpretation of the *-ko* construction than previous analyses, in that

- (i) it does not require any construction-specific mechanism (cf. Yoon's (1993, 1994, 1997) affix-raising at LF),
- (ii) it does not postulate a vacuous tense morphology (cf. Chung's (2001, 2005) postulation of a null tense in the untensed conjunct),
- (iii) it assumes only one compositional meaning of the conjunction *-ko* (cf. Sohn's (1999) and Cho's (2005) postulation of two *-kos* depending on the tense realization in the *-ko* marked sentence), and
- (iv) it appeals to a general and independently motivated discourse principle (e.g. Dowty 1986).

#### 4 Discussion: a semantic operator in the untensed conjunct?

This section briefly discusses an alternative way of analyzing the *-ko* construction. It will be shown that the analysis of tensed/untensed sentences in terms of Stump's (1985) temporal abstract is crucial in analyzing the temporal interpretation of the *-ko* construction.

In section 3, I assumed that a tense morpheme is of type  $\langle\langle i,t\rangle,\langle i,t\rangle\rangle$  since it combines with an untensed sentence (of type  $\langle i,t\rangle$ ) and produces a tensed sentence (of type  $\langle i,t\rangle$ ). However, a tense morpheme is standardly assumed to be of type  $\langle\langle i,t\rangle,t\rangle$  in the literature (Ogihara 1996 among others). In what follows, I will examine whether there are any possible ways to maintain the advantages of my analysis discussed above in a way that are compatible with this assumption.

Under the assumption that a tense morpheme is of type  $\langle\langle i,t\rangle,t\rangle$ , *-ko* combines with an expression of type  $t$  when the clause that it attaches to is tensed whereas it combines with an expression of type  $\langle i,t\rangle$  when the clause it attaches to is untensed. This necessitates two different semantic types (thus, two different compositional meanings) of a single lexical expression *-ko*; (i) if the *-ko* marked conjunct is tensed, *-ko* would be of type  $\langle\langle t,\langle t,t\rangle\rangle$ , and (ii) if the *-ko* marked conjunct is untensed, *-ko* would be of type  $\langle\langle i,t\rangle,\langle t,t\rangle\rangle$ . In order to avoid this undesirable situation in which *-ko* has two different meanings, a semantic operator that changes an expression of type  $\langle i,t\rangle$  into an expression of type  $t$  might be posited in the untensed conjunct.

Stump's (1985: 107) existential binder actually plays this role in the temporal interpretation of English sentences. In his analysis, the tensed temporal abstract (of type  $\langle i,t\rangle$ ) is existentially bound and the type  $t$  is produced at the sentential level. Following Stump, the existential binder might be postulated in the untensed conjunct of the *-ko*

construction. However, the discourse principle (16) can then no longer refer to the event time of the *-ko* marked clause since its event time is existentially bound at the level of compositional semantics under this assumption. This approach would also need to show that the existence of the existential binder is not construction-specific to the *-ko* marked clause.

Chung's (2001, 2005) claim to postulate a phonologically null tense in the untensed conjunct can also be understood in terms of these semantic operators. Although he does not spell out the temporal meaning of the null tense, it can have the same effect as the semantic operator in that it converts an expression of type  $\langle i, t \rangle$  into an expression of type  $t$ . In terms of the temporal meaning of the null tense, Chung's proposal might be fleshed out in two ways. The first possibility is to assume that the null tense is ambiguous between past and nonpast. This possibility, however, cannot account for the following example of the gapping construction: The two eventualities of the *-ko* marked clause in (24) are temporally specified by different time adverbials, but are predicated by the same verb *masi* 'drink' that is modified by a null tense.<sup>14</sup>

- (24) Jane-un ecey Mike-nun cikum i swunkan-ey ku cha-lul  
 Jane-TOP yesterday Mike-TOP now this moment-at the tea-ACC  
 masi- $\emptyset$ -ko, nayil ku mas-ul uinonha-l-yecung-i-ta.  
 drink- $\emptyset$ -KO tomorrow the taste-ACC discuss-REL-plan-be-DE  
 'Jane drank the tea yesterday, Mike is drinking the tea at this moment, and they  
 will discuss its taste tomorrow.'

If the null tense in (24) has a past tense meaning, its cooccurrence with the time adverbial *cikum-i-swunkan-ey* 'at this moment' cannot be accounted for in this analysis. Likewise, if the null tense has a nonpast meaning, it is impossible to account for its cooccurrence with the time adverbial *ecey* 'yesterday' in this analysis.

The other possibility is to assume that the temporal reference of the null tense is compositionally underspecified but is determined by discourse context. Namely, the underspecified meaning of the null tense receives its value from a contextually salient time, thus its temporal reference can be either in the past or in the nonpast. This underspecified null tense might account for the temporal interpretation of the *-ko* construction, but this approach still needs to answer why its distribution is restricted to the nonfinal conjunct of the *-ko* construction, not in other positions like main clauses and the final conjuncts of the *-ko* construction. This, again, is a construction-specific mechanism posited for the *-ko* construction.

In these respects, the assumption that the tense morpheme in Korean is of type  $\langle \langle i, t \rangle, t \rangle$  gives rise to many difficulties in analyzing the temporal interpretation of the *-ko*

<sup>14</sup>I would like to thank Yusuke Kubota for inspiring this discussion, and suggesting example (24).

construction. More specifically, this assumption cannot be adopted while maintaining all of the advantages of my analysis (i)-(iii) since it requires one to abandon at least one of them.

## 5 Conclusion

This paper investigated the temporal interpretation of the Korean *-ko* construction. I argued that the temporal relation between two event times is implicated by Aktionsart and discourse context, and such implicatures determine the temporal location of the event denoted by the untensed conjunct. I spelled out how the compositional meaning of the *-ko* construction interacts with the effect of Aktionsart and discourse context.

Unlike previous studies, my analysis neither posits any construction-specific mechanism, nor does it treat the lexical expression *-ko* in a non-uniform way. It also does not postulate a null tense morpheme. It appeals to the general and independently motivated discourse principle that also governs the temporal interpretation of simple sentences in discourse.

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