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# The Korean evidential *–te*: A modal analysis

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## 1 Introduction

Evidentiality is a linguistic category that specifies the source of information conveyed in an utterance (Aikhenvald and Dixon 2003), such as direct observation, inference, or hearsay. According to Aikhenvald's (2004) cross-linguistic study of over 500 languages, a typologically common pattern is to specify distinct sources of information with distinct morphemes, such as Quechua's three evidentials: *–mi* (for direct observation), *–chá* (for inferential evidence), and *–si* (for hearsay evidence). Previous formal analyses of evidentiality have focused on such typologically common evidential systems (e.g. Quechua in Faller 2002, St'át'imcets in Matthewson et al. 2008).

The Korean evidential system provides a novel perspective for cross-linguistic studies on evidentiality. There are no independent markers specifying distinct sources of information in Korean. But the Korean evidential *–te* appears to give rise to various evidential readings depending on which tense it occurs with. This is illustrated in (1). The evidential readings are represented in square brackets:[1]

(1) a. Context: Yesterday, the speaker was looking outside through a window. Now, he says:

Ecey pi-ka o-∅-**te**-la.
Yesterday rain-NOM fall-PRES-TE-DECL

'[I saw that] it was raining yesterday.'

b. Context: Yesterday, the speaker saw that the ground was wet. Now, he says:

Kucekkey pi-ka o-**ass-te**-la.
The.day.before.yesterday rain-NOM fall-PAST-TE-DECL

'[I inferred that] it rained the day before yesterday.'

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[1]The following glosses are used in this paper: ACC = accusative case, COMP = complementizer, DECL = declarative mood, ESSESS = *–essess*, FUT = future tense, GEN = genitive case, LOC = locative, NEG = negation particle, NOM = nominative case, PAST = past tense, PL = plural, PRES = present tense, PROG = progressive aspect, REL = relativizer, TE = *–te*, TOP = topic marker.

In (1a), *–te* occurs with the present tense, and it gives rise to the direct evidential reading, according to which the speaker directly observed that it was raining. By contrast, if *–te* occurs with past tense as in (1b), it gives rise to the indirect inferential evidential reading, i.e. the speaker did not observe raining, but he inferred it based on his observation of the wet ground.

Given this availability of an evidential reading, this paper argues that the morpheme *–te* is an evidential marker (contra Chung 2005, 2007). The evidential *–te* differs from typologically more common evidential markers in other languages (e.g. Quechua, St'át'imcets). The presence of *–te* in a sentence does not indicate a specific source of information, but its interaction with tenses determines the source of information conveyed. This paper discusses how the evidential *–te* gives rise to various evidential readings by means of interacting with tenses. This will lead us to look at the larger picture of evidential systems cross-linguistically and further our understanding of the nature of evidentiality.

This paper also addresses theoretical questions about the relationship between evidentiality and modality. By definition, evidentiality and epistemic modality are distinct notions. The former specifies source of information, and the latter specifies degree of a speaker's certainty about a proposition in question. de Haan (1999) distinguishes the two notions as follows:

(2) While epistemic modality and evidentiality both deal with evidence, they differ in what they do with that evidence. Epistemic modality EVALUATES evidence and on the basis of this evaluation assigns a confidence measure to the speaker's utterance. This utterance can be high, diminished, or low. An epistemic modality will be used to eflect this degree of confidence. An evidential ASSERTS that there is evidence for the speaker's utterance but does not interpret the evidence in any way. (de Haan, 1999, 85)

However, the literature (Izvorski 1997, McCready and Ogata 2007, Matthewson et al. 2007 among others) has noted that evidentiality and modality are closely related. The speaker's degree of certainty is significantly dependent on the source of information conveyed. In my analysis of the Korean evidential *–te*, I present empirical evidence for its modal meaning. I show how the 'evaluation' process in the sense of de Hann is involved when we acquire evidence and make a claim on the basis of it. The evidential meaning is formalized in terms of Kratzer's (1977, 1981) modal theory. This paper also discusses Chung's (2005, 2007) analysis of *–te* as a spatio-temporal operator in detail. I spell out its methodological and empirical problems, and point out that her assumptions about evidentiality is not supported by cross-linguistic studies.

This paper is organized as follows: In §2 and §3, I explore the temporal and evidential readings of *–te* sentences, respectively, and show that different evidential readings arise depending on which tense *–te* occurs with. §4 presents supporting evidence for a modal approach to the Korean evidential *–te*, and then develops a compositional analysis in terms of Kratzer's modal theory. The analysis proposed in this paper is compared with Chung's (2005, 2007) analysis in §5. The main claims of this paper are summarized in §6.

# 2 Temporal readings of *–te* sentences

## 2.1 Background: Korean tenses

There are three tenses in Korean; (i) past *–ess*, (ii) present –∅, and (iii) future *–kyess*.[2,3] Korean tenses relate the eventuality time to an evaluation time, which is the utterance time in matrix clauses as illustrated in (3), but som! e other time interval in embedded clauses as illustrated in (4).[4]

(3) a. #Ecey/cikum/#nayil pi-ka o-∅-a.
Yesterday/now/tomorrow rain-NOM fall-PRES-DECL
'It is raining #yesterday/now/#tomorrow.'

b. Ecey/#cikum/#nayil pi-ka o-**ass**-e.
Yesterday/now/tomorrow rain-NOM fall-PAST-DECL
'It rained yesterday/#now/#tomorrow.'

c. #Ecey/#cikum/nayil pi-ka o-**kyess**-e.
Yesterday/now/tomorrow rain-NOM fall-FUT-DECL
'It will rain #yesterday/#now/tomorrow.'

In (3), the eventuality time of the raining eventuality is constrained with respect to the utterance time; e.g. (i) *present* tense locates the eventuality time of the raining eventuality in the present relative to the utterance time as in (3a), (ii) *past* tense locates the eventuality time of the raining eventuality in the past relative to the utterance time as in (3b), and (iii) future tense locates the eventuality time of the raining eventuality in the future relative to the utterance time as in (3c). However, the evaluation time of Korean tenses in embedding constructions is *not* the utterance time, but some other time interval (Yoon 1996, Song 1999 among others). For example, the embedded tense of a verbal complement clauses is interpreted with respect to the eventuality time of the matrix clause eventuality.

(4) a. Chelswu-nun pi-ka o-**n**-ta-ko malha-yess-ta.
Chelswu-TOP rain-NOM fall-PRES-DECL-COMP say-PAST-DECL
'Chelswu said that it was raining.'

b. Chelswu-nun pi-ka o-**ass**-ta-ko malha-yess-ta.
Chelswu-TOP rain-NOM fall-PAST-DECL-COMP say-PAST-DECL
'Chelswu said that it had rained.'

[2]The Korean past and present tenses have phonologically conditioned allomorphs: *–ess*, *–ass*, *–ss*, *–yess* for past, and *–nun*, *–n*, *–*∅ for present.

[3]The expression *–kyess* has been analyzed as a future tense (e.g. Song 1967, Kim 1992) or a future-oriented modal element (e.g. Yoo 1993, An 1980). This paper does not discuss the two approaches in detail, but notice that in either analysis, a futurate temporal meaning is encoded in the denotation of *–kyess*. For the sake of simplicity, I gloss *–kyess* as FUT in this paper without further discussion.

[4]Since this paper does not address issues regarding aspect, I develop a compositional analysis according to this temporal meaning of tense (as relating an eventuality time to an evaluation time). However, in a fuller analysis that deals with aspect as well as tense, Reichenbach's (1947) notion of a reference time should be introduced. In the fuller analysis, tense should be defined as relating a reference time and an evaluation time, and aspect as relating a reference time and an eventuality time. The analysis proposed in this paper can be easily converted to the reference time-based system described above.

c. Chelswu-nun pi-ka o-**kyess**-ta-ko malha-yess-ta.
Chelswu-TOP rain-NOM fall-FUT-DECL-COMP say-PAST-DECL
'Chelswu said that it would rain.'

The embedded tenses in (4) are responsible for the temporal relation between the eventuality time of the raining eventuality and that of the saying eventuality: (i) With the embedded present tense, the eventuality time of the raining eventuality overlaps with that of the saying eventuality as in (4a), (ii) with the embedded past tense, the eventuality time of the raining eventuality is located prior to that of the saying eventuality as in (4b), and (iii) with the embedded future tense, the eventuality time of the raining eventuality is located after that of the saying eventuality as in (4c).

## 2.2 Temporal meanings of *–te* and its cooccurring tenses

The temporal interpretation of evidential sentences realized with *–te* exhibits the same pattern as that of embedding constructions with a past tensed matrix verb. As exemplified in (1), an evidential sentence in the morphosyntactic makeup $\phi$-TENSE-*te*-DECL involves the eventuality of the speaker acquiring evidence for the existence of an eventuality denoted by $\phi$ (Sohn 1975, Lee and Ramsey 2000, Chung 2007 among others). I call the former eventuality *an evidence acquisition eventuality*, e.g. the eventuality of the speaker acquiring visual evidence (seeing the wet ground) in (1b). As discussed in detail below, the evidential *–te* itself makes a temporal contribution: it locates the eventuality time of an evidence acquisition eventuality (henceforth, an evidence acquisition time) prior to the utterance time.[5] The evidence acquisition time plays the role of the evaluation time for tenses occurring with *–te* (Lee and Ramsey 2000). Consider the following *–te* sentences that involve different tenses.

(5) Pi-ka o-**ass-te**-la.
Rain-NOM fall-PAST-TE-DECL
'[I inferred that] it had rained.'

(6) Pi-ka o-$\emptyset$-**te**-la.
Rain-NOM fall-PRES-TE-DECL
'[I saw that] it was raining.'

(7) Pi-ka o-**kyess-te**-la.
Rain-NOM fall-FUT-TE-DECL
'[I inferred that] it would rain.'

The examples in (5)–(7) describe a raining eventuality. Henceforth, I refer to such an eventuality denoted by $\phi$ (in the morphosyntactic makeup $\phi$-TENSE-*te*-DECL) as *a described eventuality*. Assuming the normal course of a raining eventuality (according to our world knowledge), e.g. the sky being overcast (as its pre-state), raining (as its ongoing-state), the ground being wet (as its post-state), there are 9 possible temporal relations between (i) an evidence acquisition time and the utterance time, and (ii) an

[5]This temporal meaning has been noted by previous authors in va! rious ways, e.g. a 'retrospective' tense (Choi 1983), a 'retrospective' mood ('inheritantly carrying the past feature (p. 359)') (Sohn 1999 among others), a 'past' sensory observation (Song 2002), or a spatial deictic 'past' tense (Chung 2005, 2007).

evidence acquisition time and the eventuality time of a raining eventuality. They are summarized in Table 1. (EVI, DES, and UTT stand for an evidence acquisition time, an eventuality time of a described eventuality and an utterance time, respectively. $\prec$ and $\circ$ represent a temporally sequential relation and a temporal overlap, respectively.)

| | DES $\prec$ EVI | DES $\circ$ EVI | EVI $\prec$ DES |
|---|---|---|---|
| EVI $\prec$ UTT | Context 1 | Context 2 | Context 3 |
| EVI $\circ$ UTT | Context 4 | Context 5 | Context 6 |
| UTT $\prec$ EVI | Context 7 | Context 8 | Context 9 |

Table 1: Temporal relations

Each utterance context in Table 1 is exemplified in (8). The temporal relation between the utterance time and the evidence acquisition time is specified by time adverbials. The temporal relation between the evidence acquisition time and the eventuality time of a described eventuality is specified by which evidence the speaker acquires. For example, if what the speaker saw is the wet ground, then the eventuality time of the described eventuality (here, a raining eventuality) is located *prior to* the evidence acquisition time. By contrast, if the speaker saw the overcast sky, then the eventuality time of a described eventuality is located *after* the evidence acquisition time.

(8) a. Context 1: The speaker saw the wet ground yesterday.
b. Context 2: The speaker saw it raining yesterday.
c. Context 3: The speaker saw the overcast sky yesterday.
d. Context 4: The speaker is seeing the wet ground now.
e. Context 5: The speaker is seeing it raining now.
f. Context 6: The speaker is seeing the overcast sky now.
g. Context 7: The speaker will be seeing the wet ground tomorrow.
h. Context 8: The speaker will be seeing that it will be raining tomorrow.
i. Context 9: The speaker will be seeing the overcast sky tomorrow.

Crucially, there is only one context where each of the examples in (5), (6) and (7) can be uttered felicitously; (i) the past tensed *–te* sentence (5) is felicitous in context 1, (ii) the present tensed *–te* sentence (6) is felicitous in context 2, and (iii) the future tensed *–te* sentence (7) is felicious in context 3, respectively.

Notice that contexts 1, 2, and 3 have in common in that an evidence acquisition time is located prior to the utterance time, i.e yesterday. This temporal meaning is attributed to the temporal element that the examples have in common, i.e. the evidential *–te*. However, contexts 1, 2, and 3 require a different temporal relation between the eventuality time of a described eventuality and an evidence acquisition time. This different temporal meaning is due to the distinct tenses occurring in the examples in (5)–(7). That is, tenses occurring with *–te* constrain the temporal location of the eventuality time of a described eventuality with respect to an evidence acquisition time; (i) with *past* tense, the eventuality time of a described eventuality is located in the past of an evidence acquisition time, (ii) with *present* tense, the eventuality time of a described eventuality overlaps an evidence acquisition time, and (iii) w! ith *future* tense, the eventuality time of a described eventuality is located in the future of an evidence

acquisition time. This shows that in the Korean *–te* sentences, the evidence acquisition time is the evaluation time relative to which the eventuality time of a described eventuality is located. This is parallel to other embedding constructions, such as verb complement sentences because their embedded tenses are not interpreted with respect to the utterance time, but with respect to some other time; (i) the tense embedded in an evidential sentence is interpreted relative to the evidence acquisition time (induced by the evidential *–te*), and (ii) the tense embedded in a verb complement clause is interpreted relative to the eventuality time of the matrix clause eventuality.

In sum, a Korean evidential sentence realized with *–te* receives a temporal reading as follows: (i) *–te* constrains an evidence acquisition time to be temporally located prior to the utterance time, and (ii) the tense occurring with *–te* locates the eventuality time of a described eventuality relative to an evidence acquisition time (not relative to the utterance time). The temporal relation constrained by the embedded tenses affect the evidential reading of a *–te* sentence. This will be addressed in the next section.

# 3 Evidential readings of *–te* sentences

## 3.1 *–Te* is an evidential marker.

A Korean sentence in the morphosyntactic makeup $\phi$-TENSE-*te*-DECL receives an evidential reading such that the speaker had *direct* or *inferential* evidence for the existence of the described eventuality denoted by $\phi$.[6] Contra typologically common evidential systems, the Korean evidential *–te* itself does not indicate which type of evidence the speaker acquired. But if the speaker does not have appropriate evidence for a described eventuality, an evidential utterance is infelicitous as illustrated in (9).

(9) a. Context: The speaker is blind.
#Cihasil-i nemwu etwup-∅-**te**-la.
Basement-NOM very dark-PRES-TE-DECL
Intended: '[I had visual evidence that] it was very dark in the basement.'

[6] If the evidential *–te* occurs in the morphosyntactic makeup $\phi$-TENSE-DECL-*te*-DECL, then it receives a *reportative* evidential reading. In this morphosyntactic makeup, there is a declarative mood marker between the tense and the evidential *–te*. Irrespective of which tense *–te* occurs with, the following sentences receive a reportative evidential reading.

(i) a. Pi-ka o-n-ta-te-la.
Rain-NOM fall-PRES-DECL-TE-DECL
'[The speaker was told that] it was raining.'
b. Pi-ka o-ass-ta-te-la.
Rain-NOM fall-PAST-DECL-TE-DECL
'[The speaker was told that] it had rained.'
c. Pi-ka o-kyess-ta-te-la.
Rain-NOM fall-FUT-DECL-TE-DECL
'[The speaker was told that] it would rain.'

This reportative evidential meaning lends further support to my analysis of *–te* as an evidential (contra Chung 2005, 2007). This paper does not provide an analysis of the evidential *–te* occurring in this morphosyntactic makeup, but it will be addressed in Lee (forthcoming).

b. Context: The speaker is deaf.
#Tosekwan-i nemwu coyongha-∅-**te**-la.
Library-NOM very quiet-PRES-TE-DECL
Intended: '[I had auditory evidence that] the library was very quiet.'

c. Context: The speaker had never eaten kimchi. Now, he says:
#Kimchi-ka mayp-∅-**te**-la.
Kimchi-NOM taste.spicy-PRES-TE-DECL
Intended: '[I had gustatory evidence that] kimchi tasted spicy.'

d. Context: The speaker had surgery on his nose yesterday. His nose was stuffed with cotton balls. Now, he says:
#Ecey edise tha-nu-n namsay-ka na-∅-**te**-la.
Yesterday somewhere burn-PROG-REL smell-NOM exist-PRES-TE-DECL
Intended: '[I had olfactory evidence that] yesterday there was a burning smell coming from somewhere.'

Each described eventuality in (9) requires a specific evidence type: visual evidence in (9a), auditory evidence in (9b), gustatory evidence in (9c), olfactory evidence in (9d). But the required evidence is not available in each context. This results in infelicitous utterances.

Given this evidential reading with *–te*, I argue that *–te* is an evidential marker (Song 2002, contra Chung 2005, 2007). It differs from evidentials in other languages that employ distinct morphemes for specifying distinct evidence types. In Korean evidential sentences realized with *–te*, a distinct evidence type is not expressed by a distinct morpheme. But it is determined by interactions of *–te* and tenses as discussed in the following section.

## 3.2 Tenses and evidence types

As discussed in §2.2, tenses occurring with *–te* locate an eventuality time of a described eventuality relative to an evidence acquisition time. Whether the two times overlap or not affects the availability of direct evidence for the existence of a *described* eventuality.[7]

With past or future tenses, two time intervals cannot temporally overlap. This temporal relation prevents a speaker from acquiring direct evidence for a described eventuality. Based on some evidence available at the evidence acquisition time, the speaker infers that a described eventuality occurred or will occur in the past or future of the evidence acquisition time. For example, consider the evidential readings for felicitous utterances of the following past tensed *–te* sentences:

[7]Note that the discussion on evidence types here regards a described eventuality, not an eventuality causing or caused by a described eventuality. For example, in (5), if the speaker saw the wet ground, then he/she acquired direct evidence for the existence of the eventuality of the ground being wet. But the speaker did not acquire direct evidence for the existence of a raining eventuality. In this utterance, the raining eventuality is a described eventuality. So direct evidence is *not* available for the described eventuality.

(10) a. Context: The speaker saw a pile of snow on the street this morning. Now, he says:

Nwun-i o-**ass**-**te**-la.
Snow-NOM fall-PAST-TE-DECL

'[I inferred that] it had snowed.'

b. Context: The speaker works in a library. He regularly checks a noise decibel reader, and takes a note of it. Yesterday he read the previous record of a noise decibel level. Now, he says:[8]

Tosekwan-i nemwu sikkule-**ess**-**te**-la.
Library-NOM very noisy-PAST-TE-DECL

'[I inferred that] the library had been very noisy.'

c. Context: The speaker saw leftover curry in Yenghi's kitchen this morning. Now, he says:

Yenghi-ka khaley-lul mantul-**ess**-**te**-la.
Yenghi-NOM curry-ACC make-PAST-TE-DECL

'[I inferred that] Yenghi had made curry.'

In (10a), the past tense locates the eventuality time of the snowing eventuality in the past of the evidence acquisition time, i.e. the time at which the speaker saw a pile of snow. This means that the speaker cannot make a direct observation of the snowing eventuality, but he/she can only infer about its existence on the basis of the available evidence at the evidence acquisition time. The previous record of a noise decibel level in (10b) and the leftover curry in (10c) were also taken as indicating the results of an eventuality of a library being noisy and an eventuality of Yenghi cooking curry, respectively. The temporal relation constrained by the past tense allows for inferential evidence, but not a direct observation.

The occurrence of a future tense with *–te* also gives rise to an inferential evidential reading. Future tense constrains the eventuality time of a described eventuality to be located after an evidence acquisition time. Given this temporal relation, it is impossible for the speaker to acquire direct evidence for the existence of a described eventualtiy (unless he/she has a super power to make sensory observations of what happens in the future). Consider the evidential readings of the following future tensed *–te* sentences:

(11) a. Context: It was very cloudy this morning.

Onul pam-ey pi-ka o-**kyess**-**te**-la.
Today night-at rain-NOM fall-FUT-TE-DECL

'[I inferred that] it would rain tonight.'

b. Context: The exam week was over, and many students left campus.

Tosekwan-i coyongha-**kyess**-**te**-la.
Library-NOM quiet-FUT-TE-DECL

'[I inferred that] the library would be quiet.'

[8]This contextual information was suggested by Carl Pollard (p.c).

c. Context: The speaker found curry powder with sliced vegetables and meat in Yenghi's kitchen yesterday. Now, he says:
Yenghi-ka khaley-lul mantul-**kyess**-**te**-la.
Yenghi-NOM curry-ACC make-FUT-TE-DECL
'[I inferred that] Yenghi would make curry.'

In (11a), the speaker saw the overcast sky. On the basis of this evidence, the speaker inferred that it would be raining later. The examples in (11b) and (11c) also show that the speaker made inferences about the existence of the described eventualities. Given the fact that the exam week was over in (11b), the speaker inferred that the library would be very quiet. After seeing that the curry powder, vegetables and meat were ready, the speaker inferred that Yenghi would make curry even though the speaker did not see Yenghi actually cooking. In such situations where the eventuality time of a described eventuality and an evidence acquisition time do not temporally overlap, the speaker cannot make a direct observation of the ongoing state of a described eventuality. In a future tensed *–te* sentence, the speaker inferred the existence of a described eventuality on the basis of the evid! ence that he/she took as indicating the causing eventuality (or pre-state) of a described eventuality. That is, inference evidence for a described eventuality is available, but direct evidence for a described eventuality is not.

Unlike past or future tensed *–te* sentences, if *–te* occurs with present tense, the eventuality time of a described eventuality and an evidence acquisition time temporally overlap. This temporal relation affects the evidential reading of a present tensed *–te* sentence. The relevant examples are given below:

(12) a. Context: The speaker drove home. Now, he says:
Nwun-i o-∅-**te**-la.
Snow-NOM fall-PRES-TE-DECL
'[I saw that] it was snowing.'

b. Context: The speaker was at the library yesterday. Now, he says:
Tosekwan-i nemwu coyongha-∅-**te**-la.
Library-NOM very quiet-PRES-TE-DECL
'[I made an auditory observation that] the library was very quiet.'

c. Context: When the speaker woke up, he smelled something from the kitchen. Now, he says:
Yenghi-ka khaley-lul mantul-∅-**te**-la.
Yenghi-NOM curry-ACC make-PRES-TE-DECL
'[I smelled that] Yenghi was making curry.'

The examples in (12) are felicitous in given contexts where the speaker made a sensory observation of the ongoing state of the described eventualities; visual observation in (12a), auditory observation in (12b), olfactory observation in (12c).

To summarize, tenses constrain the temporal relation of the eventuality time of a described eventuality and an evidence acquisition time. This affects the evidential reading of a *–te* sentence. The following table summarizes the empirical pattern under discussion.

| Tense | PAST | PRESENT | FUTURE |
|---|---|---|---|
| Temporal relation between EVI and DES | DES $\prec$ EVI | DES $\circ$ EVI | EVI $\prec$ DES |
| Evidential reading | **inferential** | **direct** | **inferential** |

Table 2: Tenses and evidence types

# 4 Analysis

This section develops a formal account of the Korean evidential *–te*. I analyze the evidential implication of *–te* in terms of its modal meaning. §4.1 first discusses why a modal analysis is required for the evidential meaning of *–te*, and §4.2 presents a compositional analysis of a *–te* sentence in terms of Kratzer's (1977, 1981) modal theory.

## 4.1 Evidence for a modal analysis of the Korean evidential *–te*

As discussed in §3.2, the morpheme *–te* gives rise to various evidential readings depending on which tense it occurs with. Despite this availability of various evidential readings, crucially, the meaning of *–te* is *not* ambiguous in my analysis. I analyze *–te* as encoding a necessity modal meaning in a possible worlds semantic framework. This section presents evidence that motivates such a modal analysis. Each piece of evidence shows that Korean evidential utterances behave like epistemically modalized utterances.

First, a modalized utterance of the form *must* $\phi$ asserts that the prejacent $\phi$ is necessarily true. So if it is followed by assertion of the negation of $\phi$, it is infelicitous as illustrated below:[9]

(13) It must have been raining. #It did not rain.

The Korean evidential utterances exhibit the same pattern as modalized utterances; an evidential sentence of the form $\phi$-TENSE-*te*-DECL is infelicitous if the prejacent $\phi$ is asserted to be false.

(14) a. Pi-ka o-∅-te-la. #Pi-ka an-o-ess-e.
Rain-NOM fall-PRES-TE-DECL Rain-NOM NEG-fall-PAST-DECL
'[I made a sensory observation that] it was raining. #It didn't rain.'

b. Pi-ka o-ess-te-la. #Pi-ka an-o-ess-e.
Rain-NOM fall-PAST-TE-DECL Rain-NOM NEG-fall-PAST-DECL
'[I inferred that] it had rained. #It didn't rain.'

c. Pi-ka o-kyess-te-la. #Pi-ka an-o-kyess-e.
Rain-NOM fall-FUT-TE-DECL Rain-NOM NEG-fall-FUT-DECL
'[I inferred that] it would rain. #It won't rain.'

I take the parallels between (13) and (14) as suggesting that the Korean evidential *–te* has a modal meaning.

[9] Faller (2002) utilizes this test to show an epistemic modal meaning of the Quechua conjectural evidential *–chá*. It is also presented as one piece of evidence for Matthewson et al.'s (2008) modal analysis of St'át'imcets evidentials.

The next piece of evidence comes from the so-called 'Non-equi subject constraint' on *–te* sentences noted in the literature (e.g. Yang 1972, Song 2002, Chung 2005). The constraint specifies that the subject of a *-te* sentence with the present tense –∅ cannot be the speaker as exemplified in (15).

(15) a. Mary/#nay-ka hakkyo-ey ka-∅-te-la
Mary/I-NOM school-LOC go-PRES-TE-DECL
'[I made a sensory observation that] Mary/#I was going to school.'

b. Mary/#nay-ka theynis-lul chi-∅-te-la
Mary/I-NOM tennis-ACC play-PRES-TE-DECL
'[I made a sensory observation that] Mary/#I was playing tennis.'

Notice that this constraint is also imposed on English modal sentences.

(16) a. Mary/#I must be going to school.
b. Mary/#I must be playing tennis.

Based on the above parallels, I propose that the 'Non-equi subject constraint' arises from the modal meaning of *–te*. Then, the question arises as to how the modal approach can account for this constraint. I argue that it is because an epistemically modalized utterance expresses a weaker claim than an unmodalized utterance as noted in the literature (e.g. Karttunen 1972, Groenendijk and Stokhof 1975, Kratzer 1991). The following example illustrates this point.

(17) a. John must have left.
b. John has left. (Karttunen, 1972, 12)

With a *must* statement like (17a), the speaker expresses less certainty than an unmodalized statement like (17b). That is, a *must* statement makes a weaker claim. In most situations, if the target of the speaker's perception is what he/she is doing or what is happening to himself/herself at the perception time, then its truth value is known to himself/herself. For instance, whether it's true or false that the speaker is playing tennis at the evidence acquisition time (in (15)) or at the utterance time (in (16)) is already known to himself in most situations. So the speaker doesn't need to weaken its assertive strength with a modalized utterance. Rather, the speaker would just assert it. This explains why the weakened statements with evidentials in (15) and modals in (16) are infelicitous. I take the parallels in (15) and (16) as indicating that t! he evidential *–te* makes a weak statement due to its modal meaning.

This does not exclude the possibility that the speaker can make a weak statement about himself/herself. There are possibly some natural situations in which the speaker would prefer a weak statement about himself/herself. One of such possible situations is illustrated in the following Korean evidential sentence (modified from the example in Gim 1980) and English modal sentence.

(18) a. Context: Yesterday night the speaker was drunken and fell asleep. When he woke up, he realized that he was in front of his ex-girlfriend Yenghi's house. Now, he says:

Cam-ul kkay-ni nay-ka Yenghi cip aph-ey
sleep-ACC wake.up-and.then I-NOM Yenghi home front-at
iss-∅-te-la.
be-PRES-TE-DECL

'When I woke up, [I could see that] I was in front of Yenghi's house.'

b. Context: The speaker was drunken and fell asleep. When he woke up, he realized that he was in his wife's car. He said, looking at his wife:
I must be on the way home now.

The subject of both (18a) and (18b) is the speaker, but they are felicitous in the given context. Note that the speaker is not capable of full control of himself in the above context. So, in such a context the speaker would prefer uttering a weak statement about himself. This explains why the counterexample to the 'Non-equi subject constraint' in (18a) is felicitous in the above context.[10]

Furthermore, this modal approach to the 'Non-equi subject constraint' can account for the following sentences that the literature (e.g. Sohn 1975, Chung 2007) has considered as counterexamples to the 'Non-equi subject constraint'.

(19) a. Na-honca-man hakkyo-ey ka-∅-te-la
I-alone-only school-LOC go-PRES-TE-DECL
'[I noticed] only I was going to school.' (Sohn, 1975, 93)

b. Nay-ka ceyil yeppu-∅-te-la
I-NOM the.most pretty-PRES-TE-DECL
'[I noticed] I was the prettiest.' (Chung, 2007, 193)

In (19), the subject is the speaker, but both sentences are felicitous (contra the prediction of the 'Non-equi subject constraint'). These examples, however, do not pose any problems in a modal approach. Notice that (19) differs from (15) because what the speaker perceived in (19) is not just what he/she was doing or what happened to him/her at the perception time. The speaker perceived that (i) no one else was going to school at the perception time in (19a), and (ii) the speaker seems to be the prettiest among the contextually salient people in (19b). There is no reason why the speaker cannot make a weaker claim about (19a) and (19b), as the following English modal sentences do not sound odd at all.

[10] Lisa Matthewson (p.c) points out that my account of the 'Non-equi subject constraint' is intuitively similar to Chung's explanation. Chung (2005, 2007) accounts for the constraint as follows:

(i) Perception Condition on *–te*
The speaker of a *–te* sentence cannot be an active participant but should be a passive perceiver of a given situation. (Chung, 2007, 200)

The notion of 'active participants' in (i) is defined as 'participants that engage in the situation consciously and voluntarily' (Chung 2007, 200). Chung argues that the above Perception Condition is imposed because the process by which we perceive things with our senses is 'more of a passive cognitive behavior than a voluntary action'. However, Chung does not account for the constraint in terms of the modal meaning of *–te* and its assertive strength.

(20) a. No one else must be going to school now.
b. I must be the prettiest among the people around me now.

The above parallels between evidential sentences and modalized sentences suggest that the 'Non-equi subject constraint' is not a constraint on the subject, but rather it's a constraint on making a weak claim with modals and evidentials. This also lends support for a modal analysis of *–te*.

The last piece of evidence for the modal meaning of *–te* is that modal subordination phenomena (Roberts 1987, 1989) arise with *–te* (See McCready and Ogata 2007 for modal subordination with Japanese inferential evidentials). The relevant data for modal subordination (Roberts, 1989, 697) is given below:

(21) A thief might break into the house. He would/#will take the silver.

With a modal sentence, the speaker makes a hypothetical supposition, not committing himself/herself to the truth of the prejacent in the actual world. This prevents the anaphor *he* in the unmodalized sentence, which is asserted to be true in the actual world, from referring back to the preceding nominal expression *a thief* in the modalized sentence. But such an anaphoric dependency is possible if the following sentence is modalized so that it is asserted relative to the truth of the modal sentence. The following examples illustrate that the evidential *–te* behaves like a modal.

(22) Context: When the speaker got home yesterday, he found his room messy with his belongings scattered on the floor. He found a small window in the room left open. Now, he says:

a. Totwuk-i tul-ess-te-la. #Ku-nun khi-ka cak-∅-ta.
Thief-NOM break.in-PAST-TE-DECL he-TOP height-NOM short-PRES-DECL
'[I inferred that] a thief broke in. #He is short.'

b. Totwuk-i tul-ess-te-la. Ku-nun khi-ka
Thief-NOM break.in-PAST-TE-DECL he-TOP height-NOM
cak-um.ey.thullimep-ta.
short-must-DECL
'[I inferred that] a thief broke in. He must be short.'

The contrast between (22a) and (22b) is exactly the same as found in modal sentences. In (22), the speaker found his room messy and the window open. From this observation, he hypothesized that a thief had broken in. That is, by uttering an evidential sentence, the speaker does not commit himself/herself to the truth of the prejacent in the actual world. This uncertainty on the part of the speaker blocks anaphoric dependency unless the following sentence is modalized. I take this modal subordination phenomenon from *–te* to strongly indicate its modal meaning, and thus to require a modal analysis.

## 4.2 Compositional analysis

My formal analysis of Korean evidential sentences with *–te* follows the Montagovian tradition, i.e. natural language expressions are first translated into a formal translation language, and then each translation receives a model-theoretic interpretation. The

basic types of the formal language are $e$ (entities), $i$ (time intervals), $s$ (worlds), and $t$ (truth values). I use the following variables for each type: $x$, $y$, $z$ (for entities), $t$, $t'$, $t''$ (for time intervals), and $w$, $w'$, $w''$ (for worlds).

The interpretation of Korean evidential sentences in the morphosyntactic makeup $\phi$-TENSE-*te*-DECL is obtained by applying the denotation of tense to that of the untensed sentence $\phi$ (henceforth, a sentence radical), and then by applying the denotation of *–te* to that of the tensed sentence, and finally applying the denotation of the declarative marker to that of the evidential sentence.

A sentence radical denotes a function from a world to a set of time intervals at which the eventuality described by the sentence holds. Thus, it is of type $\langle s, \langle i, t\rangle\rangle$. The translation of the sentence radical *pi-ka o* 'rain' is given below. ($\Rightarrow$ stands for 'translates as').

(23) *pi-ka o* 'rain' $\Rightarrow \lambda w \lambda t[rain'(w)(t)]$

Following Stump (1985), I assume that tenses are modifiers of a sentence radical, i.e. of type $\langle\langle s, \langle i, t\rangle\rangle, \langle s, \langle i, t\rangle\rangle\rangle$. Tenses add a temporal specification as shown below. ($\circ$ and $\prec$ stand for a temporal overlap and a temporal precedence, respectively.)

(24) a. $-\emptyset$ 'PRES' $\Rightarrow \lambda P_{\langle s,\langle i,t\rangle\rangle} \lambda w \lambda t \exists t'[t' \circ t \wedge P(w)(t')]$
b. *–ess* 'PAST' $\Rightarrow \lambda P_{\langle s,\langle i,t\rangle\rangle} \lambda w \lambda t \exists t'[t' \prec t \wedge P(w)(t')]$
c. *–kyess* 'FUT' $\Rightarrow \lambda P_{\langle s,\langle i,t\rangle\rangle} \lambda w \lambda t \exists t'[t \prec t' \wedge P(w)(t')]$

A tensed clause is derived by applying the denotation of tense to that of the sentence radical in (23).

(25) a. *pi-ka o-*$\emptyset$ 'it rain-PRES' $\Rightarrow \lambda w \lambda t \exists t'[t' \circ t \wedge rain'(w)(t')]$
b. *pi-ka o-ass* 'it rain-PAST' $\Rightarrow \lambda w \lambda t \exists t'[t' \prec t \wedge rain'(w)(t')]$
c. *pi-ka o-kyess* 'it rain-FUT' $\Rightarrow \lambda w \lambda t \exists t'[t \prec t' \wedge rain'(w)(t')]$

The above tensed sentences combine with *–te*. As discussed in the preceding sections, the meaning of *–te* consists of two parts: (i) a temporal meaning (such that it locates an evidence acquisition time prior to the utterance time), and (ii) an evidential meaning (such that the speaker makes a sensory observation, and takes it as evidence for his/her inference of the existence of a described eventuality).

I analyze the evidential meaning of *–te* as a necessity modal in Kratzer's theory. In a possible worlds semantic framework, modals are analyzed as quantifying over sets of accessible worlds. Kratzer (1977, 1981) defines such accessible relations in terms of the two *conversational backgrounds*; (i) a modal base and (ii) an ordering source. The conversational backgrounds map the evaluation world $w$ onto the set of possible worlds that are accessible from $w$. I analyze *–te* as encoding a universal quantificational force over accessible worlds. I propose that the relevant conversational backgrounds for Korean evidential utterances are the modal base SO (Sensory observation) and the ordering source ST/DX (Stereotypical/Doxastic). Both SO and ST/DX are functions from world-time pairs to sets of worlds (cf. Condoravdi 2002). The modal base SO $(w,t)$ determines a set of accessible worlds that are *compatible with the speaker's sensory observation in w at t*. The translation of *–te* in terms of the modal base SO is given in (26). (This will be revised later in this section.) The temporal meaning of *–te* is specified as a temporal sequence between two time intervals. Its evidential meaning is represented in terms of the modal base SO.

(26) $-te \Rightarrow \lambda P_{\langle s,\langle i,t\rangle\rangle}\lambda w\lambda t\exists t''[t'' \prec t \wedge \forall w'[w' \in \mathrm{SO}(w,t'') \rightarrow P(w')(t'')]]$

The translation says that given a sentence radical $P$, a world $w$ and a time interval $t$, there's a time interval $t''$ that precedes $t$, and for all worlds $w'$ that are in the set of worlds given by $\mathrm{SO}(w,t'')$, the sentence radical $P$ holds at $t''$ in $w'$. However, notice that the modal base SO by itself does not guarantee the truth of a *–te* sentence. Consider the context in (27).

(27) The speaker woke up from the sound of water dripping outside. It was still dark outside. He was still in bed, but saw through the small window that water was falling to the ground.

If we assume the modal base SO alone, then some irrelevant worlds like $w_2$ and $w_3$ in (28) are also included in the accessible worlds because they are compatible with the speaker's (visual and auditory) evidence.

(28) a. $w_1$ in which it was raining outside.
b. $w_2$ in which someone upstairs was pouring water out the window.
c. $w_3$ in which the water pipe in the apartment was leaking.

Thus, we need to assume a more restricted set of accessible worlds. I restrict the set of accessible worlds by means of the Stereotypical/Doxastic (ST/DX) ordering source. $\mathrm{ST/DX}(w,t)$ imposes a ranking on the worlds in the modal base according to *the speaker's expectation/beliefs about what the world $w$ is like at, prior to, or after $t$ in terms of the acquired evidence*. The ordering source is contextually determined. Any contextual information that the speaker takes as relevant to his/her expectation about the development of the world in terms of the acquired evidence can impose an ordering on the set of acessible worlds. For example, consider what kinds of contextual information are included in the ordering source for (27). The modal base for (27) is also reproduced below.

(29) Two conversational backgrounds for (27)
a. modal base $\mathrm{SO}(w,t)$ = {Water is falling to the ground at $t$, There's the sound of water dripping outside at $t$.}
b. ordering source $\mathrm{ST/DX}(w,t)$ = {It's a rainy season at $t$, The guy who lives upstairs is on vacation at $t$, The water pipe of the speaker's apartment was recently repaired prior to $t$.}

In (27), the speaker heard the sound of water dripping and saw in his bed that water was falling to the ground. Based on the evidence, the speaker would make a hypothesis about what is happening at the evidence acquisition time. It would give the speaker various possible scenarios, e.g. $w_1$, $w_2$, $w_3$ in (28). The speaker would rank them according to his expectations and beliefs about how the world develops at the evidence acquisition time under various contextual considerations. If the speaker knows that the guy who lives upstairs is on vacation at the evidence acquisition time $t$, then he/she would infer that it's implausible that the guy is pouring water out the window at $t$. If the speaker knows that it's a rainy season at $t$, then he/she would infer that it's plausible that it is raining at $t$. In the same way, the speaker's knowledge about whether the water pipe of his apartment was recently fixed would also affect ord! ering the accessible worlds. Considering all the possible scenarios, he/she would conclude that the most

plausible scenario among $w_1$, $w_2$, $w_3$ is that it was raining at the evidence acquisition time $t$.

Now, reconsider the translation of *–te* in (30). I adopt a BEST function from Portner (1998). The function BEST(SO,ST/DX,$w$,$t$) maps world-time pairs ($w$,$t$) to sets of worlds which are the most highly ranked according to ST/DX($w$,$t$) among the worlds determined by SO($w$,$t$).

(30) $\textit{–te} \Rightarrow \lambda P_{\langle s,\langle i,t\rangle\rangle}\lambda w\lambda t\exists t''[t'' \prec t \wedge \forall w'[w' \in \text{BEST}(\text{SO},\text{ST/DX},w,t'') \rightarrow P(w')(t'')]]$

The translation of *–te* in (30) combines with that of a tensed clause in (25), and it results in (31).

(31) a. *pi-ka o-∅-te* '(I made a sensory observation that) it was raining' ⇒
$\lambda w\lambda t\exists t''[t'' \prec t \wedge \forall w'[w' \in \text{BEST}(\text{SO},\text{ST/DX},w,t'') \rightarrow \exists t'(t' \circ t'' \wedge \textit{rain}'(w')(t'))]]$

b. *pi-ka o-ass-te* '(I inferred) it had rained' ⇒
$\lambda w\lambda t\exists t''[t'' \prec t \wedge \forall w'[w' \in \text{BEST}(\text{SO},\text{ST/DX},w,t'') \rightarrow \exists t'(t' \prec t'' \wedge \textit{rain}'(w')(t'))]]$

c. *pi-ka o-kyess-te* '(I inferred) it would rain' ⇒
$\lambda w\lambda t\exists t''[t'' \prec t \wedge \forall w'[w' \in \text{BEST}(\text{SO},\text{ST/DX},w,t'') \rightarrow \exists t'(t'' \prec t' \wedge \textit{rain}'(w')(t'))]]$

Finally, the translation of a declarative marker in (32) is applied to (31). The declarative marker *–la* combines with an expression of type $\langle s,\langle i,t\rangle\rangle$, and produces an expression of type $t$. In (32), $w^*$ stands for the actual world and NOW stands for the utterance time.

(32) $\textit{–la}$ 'DECL' $\Rightarrow \lambda P_{\langle s,\langle i,t\rangle\rangle}[P(w^*,\text{NOW})]$

The final representation of a *–te* sentence realized with a distinct tense is given in (33).

(33) a. *pi-ka o-∅-te-la* '(I made a sensory observation that) it was raining' ⇒
$\exists t''[t'' \prec \text{NOW} \wedge \forall w'[w' \in \text{BEST}(\text{SO},\text{ST/DX},w^*,t'') \rightarrow \exists t'(\underline{t' \circ t''} \wedge \textit{rain}'(w')(t'))]]$

b. *pi-ka o-ass-te-la* '(I inferred) it had rained' ⇒
$\exists t''[t'' \prec \text{NOW} \wedge \forall w'[w' \in \text{BEST}(\text{SO},\text{ST/DX},w^*,t'') \rightarrow \exists t'(\underline{t' \prec t''} \wedge \textit{rain}'(w')(t'))]]$

c. *pi-ka o-kyess-te-la* '(I inferred) it would rain' ⇒
$\exists t''[t'' \prec \text{NOW} \wedge \forall w'[w' \in \text{BEST}(\text{SO},\text{ST/DX},w^*,t'') \rightarrow \exists t'(\underline{t'' \prec t'} \wedge \textit{rain}'(w')(t'))]]$

The final translation, for example, of the past tensed *–te* sentence in (33b) is as follows: there's a time interval $t''$ (the evidence acquisition time) prior to NOW (the utterance time) such that for all accessible worlds $w'$ determined by the BEST function at $t''$ in $w^*$ (the actual world), there's a time interval $t'$ which is prior to $t''$ and at which the sentence raidical *rain*$'$ holds in the world $w'$. Namely, among the worlds in which all of the facts given by the modal base SO hold, the worlds most highly ranked by the ordering source ST/DX are the ones in which it was raining. Note that the speaker does not assert that it was raining in the actual world. He/she asserts that the proposition 'it was raining' is true in the most highly ranked relevant worlds, e.g. $w_1$ in (28). It remains unasserted whether the actual world is one of the most highly ranked ! worlds, e.g. $w'$ in (33).

The three translations in (33) are the same except for the temporal relations between the evidence acquisition time $t''$ and the eventuality time of the described eventuality $t'$. (The relevant temporal relation is underlined in (33)). As already discussed, unlike languages like Quechua, Korean does not employ distinct markers for direct evidence vs. inferential evidence. However, the evidential meaning about evidence types

(direct vs. inferential) follows from the temporal relation between the two relevant eventualities. If the evidence acquisition time and the time of a described eventuality overlap, then the speaker could make a sensory observation of the ongoing state of a described eventuality (by world knowledge). This gives rise to a direct evidential reading according to which the speaker acquired direct evidence for a described eventuality (e.g. water dripping sound for a raining eventuality). If the two time inter! vals are sequentially ordered, then it is impossible for the speaker to make a sensory observation of the ongoing state of a described eventuality (by world knowledge). That is, a sequential temporal relation does not allow the speaker to acquire direct evidence for a described eventuality, but the speaker makes inferences on the existence of a described eventuality with evidence available at the evidence acquisition time. This results in an inferential evidential reading (e.g. the speaker saw the wet ground, and inferred on the existence of a raining eventuality).

In sum, I argue that *–te* is an evidential. It encodes that the speaker made a sensory observation at some past time, and on the basis of the evidence he/she inferred what the best ranked worlds look like. The evidential reading is determined by the interaction with tense. Tenses do not encode any evidential meaning, but constrain the temporal relation between an evidence acquisition time and the eventuality time of a described eventuality. Availability of direct evidence for a described eventuality in each temporal relation (sequential vs. overlapping) follows from world knowledge; a sequential temporal relation gives rise to an inferential evidential reading, and a temporal overlap gives rise to a direct evidential reading.

# 5 Comparison with Chung's (2005, 2007) analysis

Chung (2005, 2007) argues that *–te* is not itself an evidential marker, but it triggers an environment for evidentials. In her analysis, what have been analyzed as tenses in the literature, *–∅*, *–ess* and *–kyess*, are analyzed as evidentials if they occur with *–te*. She analyzes (i) ∅ as a direct evidential, (ii) *–ess* as a (result-states based) indirect evidential, and (iii) *–kyess* as a (reasoning based) indirect evidential. However, due to absence of evidential readings without *–te*, Chung assumes that *–∅*, *–ess*, and *–kyess* are ambiguous; (i) evidentials with *–te*, and (ii) temporal markers without *–te*. By contrast, my analysis does not assume this ambiguity. As tenses, they relate an eventuality time to an evaluation time irrespective of presence of *–te* as given in (24). I argue that my analysis is concep! tually superior to Chung's analysis, appealing to Occam's razor.

Chung's ambiguity analysis is motivated by her typological assumption that one evidential marker gives rise to one evidential meaning as given in (34).

(34) ... *-te* itself is not an evidential. The very purpose of an evidential system is to distinguish direct and indirect evidence, and thus it is unlikely that both direct evidence and indirect evidence are expressed by the same morpheme.
(Chung, 2007, 195)

But this assumption is not supported by cross-linguistic studies. According to Aikhenvald (2004), one of the widespread evidential systems is an A3-system that involves two evidentials: (i) a reportative evidential, and (ii) an evidential that covers every other evidence type. This evidential system is found in Tibeto-Burman languages, languages

of South America, South Arawak languages (Ignaciano, Waurá, Pareci, Piro), North Arawak languages (Resígaro) etc. (See Aikhenvald 2004 for more details.) In such a two-fold evidential system, the distinction between direct evidence vs. inferential evidence is not marked by distinct morphemes. Under Chung's assumption on 'the very purpose of an evidential system', there is no way to account for the existence of numerous languages attesting the A3-system (and also other evidential systems in which direct vs. inferential evidence type is not marked by distinct morphemes). There is one language, to my knowledge, that exhibit! s the same kind of interactions of temporal categories and evidential markers as the Korean evidential *–te*: This is Sherpa with evidential markers *–nok* and *–suŋ*. (Sherpa is a Sino-Tibetan language spoken in Tibet and Nepal.) According to Woodbury (1986), the two expressions *–nok* and *–suŋ* are evidentials although they do not indicate a specific source of information conveyed. The relevant evidence types, i.e. experiential vs. nonexperiential (inferential), are determined by temporal categories. This paper does not discuss Sherpa evidentials in detail, but Woodbury's work demonstrates that evidence types are not necessarily encoded in the meaning of evidentials, but they can be expressed by interactions between temporal categories and the evidential marker. This is exactly the same pattern as the Korean evidential *–te* exhibits.

The next problem with Chung's analysis pertains to her claim about the spatial meaning of *–te*. Chung argues that *–te* is a 'spatial deictic past tense that provides a vantage point for evidentials' (Chung, 2007, 204). In Chung's analysis, *–te* makes reference to locations as well as to time intervals. She takes the contrast in the following examples to make that point.

(35) a. Keki-nun akka pi-ka o-∅-te-la.
There-TOP a.while.ago rain-NOM fall-PRES-TE-DECL
'[I noticed] it was raining there a while ago.'

b. #Yeki-nun cikum pi-ka o-∅-te-la.
Here-TOP now rain-NOM fall-PRES-TE-DECL
'[I noticed] it is raining here now.' (Chung, 2007, 190)

Based on the examples in (35), Chung argues that *–te* is felicitous only in 'there and then' situations like (35a), but not in 'here and now' situations like (35b). However, note that the infelicitity of (35b) is due to the occurence of the temporal adverbial *cikum* 'now', but not due to the locative adverbial *yeki* 'here'. The following sets of minimal pairs illustrate this point explicitly:

(36) a. Keki-nun ecey pi-ka o-∅-te-la.
There-TOP yesterday rain-NOM fall-PRES-TE-DECL
'[I made a sensory observation that] it was raining there yesterday.'

b. Yeki-nun ecey pi-ka o-∅-te-la.
Here-TOP yesterday rain-NOM fall-PRES-TE-DECL
'[I made a sensory observation that] it was raining here yesterday.'

(37) a. #Keki-nun cikum pi-ka o-∅-te-la.
There-TOP now rain-NOM fall-PRES-TE-DECL
Intended: '[I made a sensory observation that] it is raining there now.'

b. #Yeki-nun cikum pi-ka o-∅-te-la.
Here-TOP now rain-NOM fall-PRES-TE-DECL
Intended: '[I made a sensory observation that] it is raining here now.'

The minimal pair in (36) illustrates that a present tensed *–te* sentence is felicitous with a past-time denoting adverbial, whatever locative adverbial it occurs with. By contrast, as illustrated in (37), a present tensed *–te* sentence is not felicitous with the utterance time denoting adverbial *cikum* 'now', whatever locative adverbial it occurs with.[11] The above data show that spatial references do not affect (in)felicity of evidential utterances with *–te*. Therefore, the example in (35b) is infelicitous due to the occurrence of the time adverbial *cikum* 'now'. This is correctly predicted in my analysis; *–te* locates an evidence acquisition time prior to the utterance time, and present tense locates the eventuality time of the raining eventuality as overlapping with the ev! idence acquisition time. Thus, the eventuality time of the raining eventuality is located in the past of the utterance time. This is not compatible with the meaning of the time adverbial *cikum* 'now'. The infelicity of (35b) is attributed to this conflict of temporal meanings. It has nothing to do with spatiality.

Chung also compares a non-evidential sentence with a *–te* sentence to argue for a spatial meaning of the latter. Consider her examples below.[12]

(38) a. #Cikum pakk-ey-nun pi-ka o-koiss-essess-ta.
Now outside-LOC-TOP rain-NOM fall-PROG-ESSESS-DECL
Intended: 'It was raining outside now.'

b. Cikum pakk-ey-nun pi-ka o-∅-te-la.
Now outside-LOC-TOP rain-NOM fall-PRES-TE-DECL
'[I noticed] it is raining outside now.' (Chung, 2007, 201)

Chung attributes the above contrast to the spatial meaning of *–te*. She argues that the locative adverbial *pakk-ey* 'outside' does not improve the ungrammaticality of (38a) because a spatial reference is not required for the non-evidential sentence (38a). By

[11] The adverbial *cikum* 'now' can refer to a recent past time. With this temporal meaning, the sentence (37a) is felicitous in a context like the following:

(i) Context: The speaker saw on TV that it was raining in Hawaii. Five minutes later, he got a call from his friend who lives in Hawaii. The speaker said to his friend:

Keki-nun cikum pi-ka o-∅-te-la.
There-TOP recent.past rain-NOM fall-PRES-TE-DECL

'[I made a sensory observation that] it was raining there at a (contextually salient) recent past time.'

In (i), the contextually salient time is the time at which the speaker watched TV, i.e. five minutes prior to the utterance time. This sentence does not pose any problem for my analysis of the temporal meaning of *–te*. In my analysis, *–te* itself encodes the meaning that the evidence acquisition eventuality is prior to the utterance time, here at the recent past time. And with present tense, the eventuality time of the raining eventuality and the evidence acquisition time temporally overlap.

[12] Chung (2005) analyzes the two post-verbal morphemes *–ess* and *–essess* as a perfective aspect and a simple past tense, respectively. For reasons of space, this paper does not discuss the temporal meaning of *-ess* and *–essess* in detail, but see Lee (1987) and Lee (2007) for their contrastive meaning. Following the previous studies (Choe 1977, An 1980, Gim 1985, Lee 1987, Chong 1990, Sohn 1995, Yoon 1996, Lee 2007 among others), I assume that *–ess* is a past tense. I gloss *–essess* as ESSESS without further discussion.

contrast, (38b) is grammatical because *–te* encodes a spatial reference compatible with the adverbial *pakk-ey* 'outside'.

However, the examples in (38) do not illustrate Chung's claim about spatiality. The two sentences in (38) are not minimal pairs. They might have different grammaticality for other reasons, namely the presence of *cikum* 'now' as discussed above. The time adverbial *cikum* 'now' has the so-called 'extended now' meaning; (i) it refers to an utterance time, but (ii) it can also denote a recent past. Both (38a) and (38b) are infelicitous when *cikum* 'now' refers to an utterance time. However, with a recent past meaning of *cikum* 'now', there is a contrast between the two examples: The *–te* sentence (38b) is felicitous as in the example (i) in footnote 11, but the non-evidential sentence (38a) is infelicitous. This infelicity is well known in the literature (e.g. Lee 2007). The post-verbal morpheme *–essess* gives rise to a preterit pluperfect reading that is not compatible with the recent past meaning of *cikum* 'now' (parallel to English past perfect). This is illustrated in the following example.

(39) a. #Chelswu-ka cikum ttena-essess-ta.
Chelswu-NOM now leave-ESSESS-DECL
Intended: 'Chelswu had left at a (contextually salient) recent past time.'

b. #Chelswu-ka pangkum ttena-essess-ta.
Chelswu-NOM a.minute.ago leave-ESSESS-DECL
Intended: 'Chelswu had left a minute ago.'

Given this, the contrast between (38a) and (38b) is due to the (in)compatibility of the temporal meaning of *–te* and *–essess* with the recent past meaning of *cikum* 'now'. The spatial meaning arising from *pakk-ey* 'outside' has nothing to do with the contrast in (38). The examples in (35) and (38) are the only examples discussed in her paper to argue for a spatial meaning of *–te*. However, once the meaning of *–te* is examined more thoroughly, her analysis of *–te* as a spatio-temporal operator is not empirically supported.

Furthermore, the spatio-temporal trace functions utilized by Chung make incorrect predictions on a described eventuality in question. Chung formalizes the meaning of *–te* in terms of the following three spatio-temporal trace functions. (She adopts the first two functions from Faller 2004).[13]

(40) a. $e\text{-}trace(e) = \{< t, l > | t \subseteq \tau(e) \wedge \text{AT}(e, t, l)]\}$
$\text{AT}(v, t, l)$ is true iff the eventuality $e$ takes place at location $l$ at time $t$.

b. $P\text{-}trace(s_c) = \{< t, l > | t \subseteq \tau(s_c) \wedge \text{PERCEIVE}(s_c, t, l)]\}$
$\text{PERCEIVE}(s_c, t, l)$ is true iff the speaker $s_c$ perceives location $l$ at time $t$.

c. $v\text{-}trace(e) = \{< t, l > | \exists v[\text{EVIDENCE-FOR}(v, e) \wedge \text{AT}(v, t, l)]\}$
$\text{AT}(v, t, l)$ is true iff the evidence $v$ for the occurrence of the eventuality $e$ appears at a location $l$ at time $t$.

The *e-trace* function maps an eventuality ($e$) to its time-space coordinates $< t, l >$, and the *P-trace* function maps a speaker ($s_c$) to his/her perceptual field for each time $t$ in his/her life time (i.e. during his/her run time $\tau(s_c)$). The *v-trace* function maps an

[13] Chung utilizes the temporal trace function $\tau$ in two different ways, (i) mapping an eventuality to its run time (e.g. (40)), and (ii) mapping a spatiotemporal location to its temporal demension (e.g. (41)).

eventuality ($e$) to the time-space coordinates $< t, l >$ of the evidence of the eventuality. Now, in terms of these spatio-temporal trace functions, consider the denotations of *–∅*, *–ess*, *–kyess* that Chung analyzes as evidentials: (The variable $L$ for spatiotemporal locations denotes a set of time-space coordinates.)

(41) a. $[[-\emptyset]]^c = \lambda P \lambda L \exists e[P(e) \wedge \tau(L) \subseteq \tau(e) \wedge L \subseteq \upsilon\text{-}trace(e) \wedge e\text{-}trace(e) \cap P\text{-}trace(s_c) \neq \emptyset]$ (simplified as $[[-\emptyset]]^c = \lambda P \lambda L \exists e[P(e) \wedge L \subseteq e\text{-}trace(e)]$)

b. $[[-ess]]^c = \lambda P \lambda L \exists e[P(e) \wedge \tau(e) < \tau(L) \wedge L \subseteq \upsilon\text{-}trace(e) \wedge e\text{-}trace(e) \cap P\text{-}trace(s_c) = \emptyset]$

c. $[[-kyess]]^c = \lambda P \lambda L \exists e[P(e) \wedge \tau(L) < \tau(e) \wedge L \subseteq \upsilon\text{-}trace(e) \wedge e\text{-}trace(e) \cap P\text{-}trace(s_c) = \emptyset]$

As indicated by the existential binding of a described eventuality $e$ in (41), Chung's analysis says that a described eventuality is realized in the actual world if the speaker infers it based on his/her evidence. However, with the Korean evidential sentence of the form $\phi$ TENSE *–te* DECL, the speaker does not assert the truth of the prejacent $\phi$ in the actual world. This is because the speaker's evidence from his/her sensory observation does *not* necessarily lead to his/her commiting to the existence of an eventuality in the actual world. Consider the following examples for auditory evidence:

(42) Context: The speaker woke up from the sound of somebody using water in the bathroom. Now, the speaker says to his roommate:

a. #Ne ecey pam-ey shyawueha-yess-e.
You yesterday night-at take.shower-PAST-DECL
'You took a shower yesterday night.'

b. Ne ecey pam-ey shyawueha-∅-te-la.
You yesterday night-at take.shower-PRES-TE-DECL
'[I made a sensory observation that] you were taking a shower yesterday night.'

In (42), the speaker perceived the water dripping sound from the bathroom, and hypothesized that the water dripping sound was caused by his rommate's taking a shower. If the speaker makes such a hypothetical assumption, he/she is not committing himself/herself to its truth in the actual world. Thus, the speaker cannot make a full assertion as in (42a), but prefers a weak statement as in (42b). My analysis correctly predicts this assertive strength of Korean evidential sentences. They are weak statements involving a necessity modal, irrespective of evidence types. As shown in (33), the prejacent of a *–te* sentence is asserted to be true in the most highly ranked relevant worlds, but not in the actual world.

In Chung's analysis, however, lack of a modal component in the denotation of a *–te* sentence leads to the following wrong prediction: whatever the speaker infers from his/her sensory observation is true in the actual world. For example, given the wet ground, different people can draw different conclusions about what happened prior to the evidence acquisition time; some might infer that it rained, and others might infer that it snowed. Crucially, all possible scenarios cannot be true in the actual world. However, her analysis says that a described eventuality is realized in the actual world if the speaker infers it based on his/her evidence. In a nutshell, Chung's analysis does

not capture the modal nature of our inferences based on evidence, and this leads to a wrong prediction about the actual world.

# 6 Conclusion

This paper formally analyzed the evidential readings of Korean sentences realized with *–te*. Unlike languages with typologically common evidential systems, Korean does not employ distinct evidentials for distinct sources of information conveyed. However, the evidence types available with *–te* sentences are predicted by its interactions with temporal categories. This provides a new perspective in cross-linguistic studies of evidentiality; an evidential meaning is not necessarily marked by independent morphemes, but it can be expressed by interactions with other grammatical categories.

Furthermore, I discussed why a modal approach to the evidential *–te* is necessary, and developed a compositional analysis in terms of Kratzer's modal theory. The relation of evidentiality and modality is cross-linguistically varied, too. Some previous studies argued for a modal meaning of evidentials (e.g. Izvorski 1997 for Bulgarian, Turkish and Norwegian; McCready and Ogata 2007 for Japanese; Matthewson et al. 2008 for St'át'imcets), and others argued against it (e.g. Faller 2002 for Quechua). This paper does not make a claim for language universals on the relationship of evidentiality and modality. But the crucial point made in this paper is that a modal analysis of *–te* is necessitated in order to capture our inference processes on the basis of evidence. In particular, the two core notions in Kratzer's system, a modal base and an ordering source, are crucial to formalize the process of our evaluating evidence (in the sense of de H! aan 1999) and making a claim on the basis of it. This view differs from de Haan's view on evidentials as "asserting that there's evidence for the speaker's utterance but does not interpret the evidence in any way (de Haan 1999)". More cross-linguistic data needs to be taken into consideration to make further remarks on the relationship of evidentiality and modality, but this paper presented one case study of the Korean evidential *–te* as a modal with empirical evidence and a compositional analysis.

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