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Title

A Compositional Semantic Analysis of Echo Questions in Korean

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Publication Date

2021-01-17

Comprehensive Research Paper — Seoyeon Jang
A Compositional Semantic Analysis of Echo Questions in Korean
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Abstract: Echo questions (*echo-Qs*) are known to occur in two main types: first-order echo-Qs (*1st-echo-Qs*), which require appropriate statements to have been introduced in the discourse, and second-order echo-Qs (*2nd-echo-Qs*), which require appropriate questions to have been previously introduced in the discourse (Karttunen 1977). It has been argued in the literature that echo-Qs in Indo-European languages such as English involve a phonologically null complementizer, and in cases of multiple-*wh* echo-Qs, only intonation distinguishes them from ordinary interrogative clauses (cf. Comorovski 1996; Dayal 1996, 2016; Sudo 2010). This identity is compatible with analyses that assume the same phonologically null complementizer for both kinds of echo-Qs (cf. Dayal 1996, 2016; Sudo 2010). However, such a uniform approach cannot naturally capture the morpho-syntactic properties of Korean echo-Qs and the corresponding mapping with the semantics/pragmatics of echo-Qs. Unlike English, Korean clearly distinguishes 1st- and 2nd-echo-Qs from each other and from ordinary interrogative clauses by means of overt morpho-syntactic marking: three different complementizers. The complementizer *-tako*↑ occurs in 1st-echo-Qs with rising final intonation, *-nyako*↑ occurs in 2nd-echo-Qs with rising final intonation as in 1st-echo-Qs, and *-ni* occurs in ordinary interrogative clauses.

This paper proposes that each complementizer is associated with a similar semantic operation: a set formation operation. The complementizers differ in the members that populate the set they generate. The ordinary interrogative complementizer *-ni* and the 1st-echo-Q complementizer *-tako*↑ form a set of propositions, and the 2nd-echo-Q complementizer forms a set of questions (a set of sets of propositions). Unlike *-ni*, the echo-Q complementizers also introduce a presuppositional requirement: the members of the set they form have to have been “previously uttered”, as proposed in Dayal (1996).

The present paper proposes the first compositional semantic analysis of Korean echo-Qs, based on existing analyses of English ordinary interrogatives (Hamblin 1973; Karttunen 1977) and develops and significantly modifies previous semantic analyses of echo-Qs, in particular Dayal (1996, 2016). By doing so, this paper enriches our current understanding of echo-Qs from the perspective of a less-studied language.

A Compositional Semantic Analysis of Echo Questions in Korean

Seoyeon Jang

June 2020

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1 Introduction

Echo questions (echo-Qs, henceforth) are interrogative clauses that require and partially repeat previously uttered sentences (cf. Banfield 1982; Comorovski 1996; Dayal 1996, 2016; Noh 1998; Artstein 2002; Sudo 2010). It follows that echo-Qs can never be uttered out of the blue or be used to start a discourse. Echo-Qs are often distinguished from ordinary interrogatives by the sentence-final rising intonation (Pope 1972; Bolinger 1987) and echo *wh*-expressions being allowed to be in-situ in languages that otherwise require *wh*-movement (Sobin 1990; Comorovski 1996). English examples of echo-Qs are exemplified below; (1-B1) is a polar echo-Q that contains no *wh*-expressions, while (1-B2) is a *wh*-echo-Q. (1-A) is the declarative clause antecedent of (1-B1) and (1-B2).

- (1) A: I'm leaving on Tuesday.
B1: You're leaving on Tuesday?
B2: You're leaving WHEN? (Noh 1998: 603)

Echo-Qs have received relatively scant attention when compared to ordinary interrogative clauses, and research on the formal semantics of echo-Qs has been even more limited. Although there have been some exceptions that discuss the semantics of echo-Qs, such as Dayal (1996), Artstein (2002), and Sudo (2010), their analyses were built mainly upon English. Hence, it is an open issue whether these accurately represent the cross-linguistic variation of echo-Qs in languages that behave differently from English, such as Korean.

Korean requires a *final ending* (or an *ender*) surfacing as the final suffix in every clause. The endings that appear in matrix clauses are called *sentence-final endings*; by being attached to the verb, they mark clause types (Sohn 2013). The endings that occur in echo-Qs are different from, for example, those in matrix ordinary interrogative clauses or matrix declarative clauses. Furthermore, Korean is not the only language that clearly distinguishes echo-Qs from matrix ordinary interrogatives by means of overt morpho-syntactic marking; Japanese is another one, as briefly mentioned in Sudo (2010).¹ However, as mentioned earlier, little attention has been paid so far to the interface between the morpho-syntax and the semantics/pragmatics of echo-Qs in these languages.

The present paper proposes the first compositional semantic analysis of Korean echo-Qs, based on existing analyses of English ordinary interrogatives (Hamblin 1973; Karttunen 1977) and develops and significantly modifies previous semantic analyses of echo-Qs, in particular Dayal (1996, 2016). By doing so, this paper enriches our current understanding of echo-Qs from

¹According to Sudo (2010), the Japanese question particle *tte* is only found in echo-Qs, while the ordinary question particle *no* occurs in ordinary interrogative clauses. An example of a Japanese ordinary interrogative clause is given in (a), while an example of a Japanese echo-Q is given in (b) (Sudo 2010: 8-9).

- a. John-ga nani-o katta **no**?
 John-NOM what-ACC bought Q
 ‘What did John buy?’
- b. John-ga nani-o katta **tte**?
 John-NOM what-ACC bought Q
 ‘John bought a WHAT?’

the perspective of a less-studied language.

The remaining part of the paper is constructed as follows. Section 2 first describes the basics of Korean grammar that are relevant for discussing echo-Qs—word order, final endings, and clause types. Then, Section 3 introduces previous descriptive generalizations on echo-Qs across languages and examines if the generalizations apply to Korean as well. Section 4 presents a compositional analysis of Korean echo-Qs. Lastly, Section 5 concludes.

2 Basic Properties of Korean

This section introduces the basic properties of Korean that will be relevant for our discussion of echo-Qs, such as word order, final endings, and clause types. Korean has an SOV word order that allows pre-verbal constituents to be scrambled. Inflectional morphemes attach to the right end of the verb stem in a rather rigid order and convey information such as tense, mood, speech level, and clause type (Sohn 2013). Those morphemes again diverge into two categories: *final endings*, which appear in the rightmost, clause-final position, functioning as a complementizer, and will be labeled *complementizers* in the remainder of the paper², and *pre-final endings*, which appear in between the

²In the field of Korean linguistics, it has been a long controversy whether all final endings, regardless of whether they occur in subordinate clause or matrix clauses, should be considered as complementizers. Some have argued that only the subordinate-final endings should be interpreted as complementizers and the matrix-final endings (sentence-final endings) should be assigned a distinct syntactic category (E, from ENDING), for that the matrix-final endings cannot embed subordinate clauses and the subordinate-final endings cannot conclude a sentence (see Choe (2003), among others). On the contrary, others have argued that such functional distinction is not necessary, given that some of the

verb stem and the final ending (Suh 2016). Pre-final endings include suffixes such as honorifics, tense and mood markers but they are not obligatory; the sentence-final ending (the final ending in the matrix clause-final position) is the only obligatory one, indicating the type of the sentence.³ The examples in (2) are different possible Korean counterparts of the declarative sentence ‘Mina liked John.’

- (2) Korean matrix declarative clauses⁴
- a. Mina-ka John-ul cohaha-ess-*(**ta**).
 Mina-NOM John-ACC like.do-PST-**C_{DC}**
 ‘Mina liked John.’

subordinate-final endings can occur in matrix clauses as well (see Um (2005) and Suh (2016), among others). The present paper follows the latter approach (to be discussed further in Sec. 3.2). Henceforth, the term *complementizer* will be used in order to refer to final endings.

³The following table illustrates the paradigm of sentence-final endings in Korean declarative, interrogative, imperative, and propositive sentences under six levels of speech (Plain, intimate, familiar, blunt, polite, and deferential; familiar and blunt forms are rarely used in modern spoken Korean) (Sohn 2013: 413).

| | Declarative | Interrogative | Imperative | Propositive |
|--------------------|--------------|----------------|------------|-------------|
| Plain | -ta | -ni?/-nya? | -la | -ca |
| Intimate | -a/-e | -a?/-e?/-ay? | -a/-e | -a/-e |
| Familiar | -ney | -na?/-nun-ka? | -key | -sey |
| Blunt | -(s)o/-(s)wu | -(s)o?/-(s)wu? | -(u)o/-wu | -(u)p-ti-ta |
| Polite | -yo | -yo? | -yo | -yo |
| Deferential/formal | -(su)p-ni-ta | -(su)p-ni-kka? | -sip-si-o | -sip-si-ta |

⁴The Yale romanization system is used in transcribing Korean examples throughout this paper. The acceptability of each Korean example is judged by a couple of consultants, who are non-linguist native speakers of Korean. The following abbreviations are used in glosses: ACC = Accusative; AH = Addressee Honorifics; C = Complementizer; CM = Comitative; CONN = Connective; COP = Copular; DC = Declarative; IND = Indicative; INF = Infinitive; MD = Pre-nominal Modifier; NM = Nominalizer; NOM = Nominative; PERF = Perfective; POL = Polite; PROP = Propositive; PST = Past Tense; RS = Reported Speech; Q = Interrogative.

- b. Mina-ka John-ul cohaha-ess-*(**sup-ni-ta**).
 Mina-NOM John-ACC like.do-PST-**AH-IND-C_{DC}**
 ‘Mina liked John.’

The tense marker in (2), *-ess*, is a pre-final ending, and the declarative complementizers, *-ta* in (2-a) and *-sup-ni-ta* in (2-b), are final endings. Each of the complementizers conveys the following pieces of information: (i) the sentence type (declarative), (ii) the attitude of the speaker to the addressee (i.e., the speaker of (2-b) is being deferential to the addressee, while that of (2-a) is being neutral), and (iii) the discourse setting (i.e., (2-b) is uttered in a formal discourse such as in the courtroom, while (2-a) is not).⁵ Intonation is falling on both complementizers.⁶

Let us now consider interrogative sentences. Korean counterparts of the English interrogative sentence ‘Did Mina like John?’ are given in (3).

(3) Korean matrix polar interrogative clauses

- a. Mina-ka John-ul cohaha-ess-*(**ni**)↑?
 Mina-NOM John-ACC like.do-PST-**C_Q**
 ‘Did Mina like John?’

⁵Even though *-sup-ni-ta* consists of three morphemes, they as a whole seem to function as one declarative complementizer because all those three morphemes are required to form a deferential speech. That is, the clusters such as *-sup-ta* (missing the IND *-ni*) or *-ni-ta* (missing the AH *-sup*) fail to form a well-formed deferential declarative sentence. The single morpheme *-ta* does form a grammatical sentence, as in (2-a); however, then the deferential attitude is lost. The same applies to deferential interrogative clauses, as exemplified in (3-b).

⁶Following previous analyses of intonational phonology of standard Korean, the present paper considers declaratives and *wh*-interrogatives as having falling tone (HL%) and echo-Qs (termed as *incredulity questions* in Jun and Oh (1996)) and polar interrogatives as having rising boundary tone (H%) (see Jun and Oh (1996) and Jun (2005), among others). Henceforth in the examples, the sentence-final intonation is marked by an upwards arrow (↑) if rising, unmarked otherwise.

- b. Mina-ka John-ul cohaha-ess-*(sup-ni-kka)↑?
 Mina-NOM John-ACC like.do-PST-**AH-IND-C_Q**
 ‘Did Mina like John?’

Both (3-a) and (3-b) are polar interrogative clauses performing the speech act of questioning; they are genuine requests of information, asking for an yes/no answer. As shown in (3), interrogative clauses have the same word order as declarative clauses; no overt movement is required. Similar to the declarative complementizers in (2), each of the interrogative complementizers, *-ni* in (3-a) and *-up-ni-kka* in (3-b), conveys the following pieces of information: (i) the sentence type (interrogative), (ii) the attitude of the speaker to the addressee (i.e., the speaker of (3-b) is being deferential to the addressee, while that of (3-a) is being neutral), and (iii) the discourse setting (i.e., (3-b) is uttered in a formal discourse, while (3-a) is not). Both complementizers trigger an obligatory final rising tone.

Therefore, the main morpho-syntactic difference between declarative and polar interrogative clauses lies in the complementizer and its intonation; a change in either of them fails to maintain the meaning. For instance, if the falling intonation on the examples in (2) is replaced with the rising intonation, then the examples become unacceptable. Also, if the rising intonation on the examples in (3) is replaced with the falling intonation, then the examples become unacceptable, or at best, are interpreted as rhetorical questions rather than genuine questions.

In sum, it is necessary for speakers of Korean to make appropriate choices

between various complementizers and intonation based on grammatical and contextual information in order to build a well-formed sentence. The declarative complementizer *-ta* and the interrogative complementizer *-ni* will be used in the examples in the next sections.

3 Korean Echo-Qs

The previous section has briefly described the basics of Korean grammar. Section 3.1 first summarizes previous findings about the relation between echo-Qs and their discourse antecedent and discusses if the generalizations apply to Korean as well. Then, Section 3.2 provides a closer examination of the morpho-syntax of Korean echo-Qs.

3.1 Similarity to English echo-Qs

It has been widely argued that echo-Qs cannot be uttered out of the blue. The existence of a previously uttered sentence is required, and regardless of the sentence type of the antecedent, echo-Qs partially repeat it (cf. Banfield 1982; Comorovski 1996; Artstein 2002). The example pairs in (4) show how English echo-Qs resemble a sentence that has been uttered right before them. Capital letters indicate “echoed” *wh*-expressions and smaller-sized expressions indicate auditory failure or surprise.

- (4) a. A: Mina brought the meat.
B: Mina brought WHAT?

- b. A: Have you brought *the meat*?
 B: Have I brought WHAT?
- c. A: Bring *the meat*.
 B: Bring WHAT?

The echo-Qs in (4)—all the B-sentences—mimic the previously uttered sentence—the A-sentences—without altering their syntactic structures but with some constituents being replaced with *wh*-expressions. However, note that *wh*-expressions may replace non-constituents, such as parts of words, as shown in (5-B), and echo-Qs allow paraphrases of the antecedent, as shown in (6-B).

- (5) A: Bill is an orthodontist.
 B: Bill is a WHAT-dontist? (Artstein 2002: 103)
- (6) A: John speaks Uyghur.
 B: John speaks a FOREIGN LANGUAGE? (Sudo 2010: 9)

Based upon the examples such as (5-B) and (6-B), Artstein (2002) and Sudo (2010) have shown that echo-Qs do not need to be completely equivalent to their antecedent; that is, the resemblance between echo-Qs and their antecedent is not required to be strict.

Similar to English, Korean echo-Qs do resemble the syntactic structure of their previous utterance. Nevertheless, the complementizer in echo-Qs takes different forms, according to the sentence type of the antecedent. The Korean counterparts of the pairs in (4) are given in (7).

- (7) a. A: Mina-ka _{koki-lul} kacyeo-o-ass-**ta**.
 Mina-NOM meat-ACC bring-come-PST-**C_{DC}**
 ‘Mina brought the meat.’
- B: Mina-ka mwue-lul kacyeo-o-ass-**tako**↑?
 Mina-NOM what-ACC bring-come-PST-**C_{ECHO}**
 ‘Mina brought WHAT?’
- b. A: Ne _{koki-lul} kacyeo-o-ass-**ni**↑?
 You meat-ACC bring-come-PST-**C_Q**
 ‘Have you brought the meat?’
- B: Na mwue-lul kacyeo-o-ass-**nyako**↑?
 I what-ACC bring-come-PST-**C_{ECHO}**
 ‘Have I brought WHAT?’
- c. A: _{koki-lul} kacyeo-o-a-**la**!
 meat-ACC bring-come-INF-**C_{IMP}**
 ‘Bring the meat!’
- B: mwue-lul kacyeo-o-**lako**↑?
 what-ACC bring-come-**C_{ECHO}**
 ‘Bring WHAT?’
- d. A: _{koki-lul} kacyeo-o-ca.
 meat-ACC bring-come-**C_{PROP}**
 ‘Let’s bring the meat.’
- B: mwue-lul kacyeo-o-**cako**↑?
 what-ACC bring-come-**C_{ECHO}**
 ‘Let’s bring WHAT?’

Each of the echo-Q complementizers, *-tako* in (7-a), *-nyako* in (7-b), *-lako* in (7-c), and *-cako* in (7-d), matches to the type of the previously uttered sentence of an echo-Q. Echo-Qs with *-tako* require a declarative antecedent, echo-Qs with *-nyako* require an interrogative antecedent, echo-Qs with *-lako* require an imperative antecedent, and echo-Qs with *-cako* require an propos-

itive antecedent. This matching between the type of the previously uttered sentence and the complementizer in echo-Qs is obligatory; for instance, the echo-Q for A’s utterance in (7-a) will be infelicitous if it ends with other echo-Q complementizers than *-tako*.⁷

Moreover, Korean also allows echo-Qs to echo smaller parts of words or to paraphrase the antecedent. An example in (8-B) shows an echoed *wh*-expression replacing a part of a word, while (9-B) shows that echo-Qs can paraphrase their antecedent.

- (8) a. A: ku sosel-ey-nun [_{phipcinseng}]-i eps-ta.
that novel-in-TOP **verisimilitude**-NOM lack-C_{DC}
‘That novel lacks verisimilitude.’
- B: ku sosel-ey-nun [**mwus-un -seng**]-i eps-tako↑?
that novel-in-TOP [**what-MD -itude**]-NOM lack-C_{ECHO}
‘That novel lacks WHAT-itude?’
- (9) a. A: Mina-ka [_{John}]_i-ul cohaha-ess-ta.
Mina-NOM **John**-ACC like.do-PST-C_{DC}
‘Mina liked John.’
- B: Mina-ka [**ku nom**]_i-ul cohaha-ess-tako↑?
Mina-NOM [**that jerk**]-ACC like.do-PST-C_{ECHO}
‘Mina liked THAT JERK?’

⁷In the literature on Korean echo-Qs, there have been two approaches to the morpho-syntax of the *-tako*-type echo-Q markers in Korean (*-tako*, *-nyako*, *-lako*, *-cako*). One approach is to decompose them into two distinct complementizers, the final ending *-ta* (or *-nya*, *-la*, *-ca*) and the quotative particle *-ko*; under this approach, the final endings are considered as the complementizer of the subordinate clause and *-ko* is considered as the complementizer of the matrix clause, which in turn triggers the echo-Q reading (e.g. Kim 1999; Lee 2010; Sohn 2015). The other approach is what is adopted in this paper: to treat *-tako* as a monomorphemic complementizer (e.g., Ahn 1992; Myeong 2017; Lee 2019). Further discussion follows in Sec. 3.2.

To summarize, Korean echo-Qs, similar to echo-Qs in English, majorly overlap in morpho-syntactic shape with some previously uttered sentence. On the other hand, unlike English, Korean characterizes its echo-Qs with a series of complementizers that vary according to the speech act properties of the previously uttered sentence that the echo-Q is built on. The next section proceeds to a close examination of the morpho-syntax of Korean echo-Qs.

3.2 English vs. Korean: the Morpho-Syntax of Echo-Qs

Among the various types of echo-Qs with their antecedent conveying different speech acts, two types have been of primary concern in previous literature since first noted by Karttunen (1977): a type of echo-Qs that require appropriate statements to have been introduced in the discourse, which is referred to as a first-order echo-Q (1st-echo-Q), and a type of echo-Qs that require appropriate questions to have been previously introduced in the discourse, which is labeled as a second-order echo-Q (2nd-echo-Q). An English example of a 1st-echo-Q is given in (10-B) with its declarative clause antecedent given in (10-A). (11-B) exemplifies an English 2nd-echo-Q with (11-A) showing its interrogative clause antecedent.

(10) English 1st-echo-Q

A: Mina brought the meat.

B: Mina brought WHAT?

(11) English 2nd-echo-Q

A: Who brought the meat?

B: Who brought WHAT?

As shown in (10)-(11), English does not make a clear morpho-syntactic distinction between 1st-echo-Qs and 2nd-echo-Qs and between echo-Qs and ordinary interrogatives. Korean, however, clearly distinguishes 1st-echo-Qs and 2nd-echo-Qs from each other by means of overt morpho-syntactic marking: two different complementizers. The complementizer *-tako* (sometimes Romanized as *-dago*) occurs with rising final intonation (↑) in 1st-echo-Qs ((12-B), with its antecedent declarative clause in (12-A)), *-nyako* (sometimes Romanized as *-nyago*) occurs with rising final intonation in 2nd-echo-Qs ((13-B), with its antecedent interrogative clause in (13-A)).

(12) Korean 1st-echo-Q

A: Mina-ka koki-lul kacyeo-o-ass-ta.
Mina-NOM meat-ACC bring-come-PST-*C_{DC}*
'Mina brought the meat.'

B: Mina-ka mwue-lul kacyeo-o-ass-**tako**(-yo)^{8↑}?
Mina-NOM what-ACC bring-come-PST-*C_{ECHO}*(-POL)
'Mina brought WHAT?'

(13) Korean 2nd-echo-Q

A: Nwuka koki-lul kacyeo-o-ass-ni?
who.NOM meat-ACC bring-come-PST-*C_Q*
'Who brought the meat?'

B: Nwuka mwue-lul kacyeo-o-ass-**nyako**(-yo)↑?
 who.NOM what-ACC bring-come-PST-*C_{ECHO}*(-POL)
 ‘Who brought WHAT?’

As glossed in the above examples, the present paper considers the echo-Q complementizers as monomorphemic *C_{ECHO}*. In previous studies on Korean echo-Qs, one of the much debated questions has been the morpho-syntactic status of the *-tako*-type final endings. The predominant approach has claimed that echo-Qs as a type of indirect speech in which the matrix verb is omitted and the echo-Q reading is triggered by the quotative particle *-ko* that follows the final ending of the subordinate, quoted (or reported) clause; that is, *-ko* is the echo-Q complementizer (e.g., Noh 1995; Kim 1999; Lee 2010). (14-B) shows an example of an indirect speech, while (14-B′) shows an example of an echo-Q, with their antecedent declarative clause in (14-A).

- (14) A: Paris-ey ka-n cek i-ss-ni?
 Paris-to go-MD experience COP-PST-*C_Q*
 ‘Have you ever been to Paris?’
- B: [[[eti-ey ka-n cek i-ss-**nya**]-**ko**]
 where-to go-MD experience COP-PST-*C_Q*-*C_{QT/ECHO}*
 mwul-ess-ni?]
 ask-PST-*C_Q*
 ‘Did you ask if I have ever been to WHERE/where⁹?’
- B′: [[eti-ey ka-n cek i-ss-**nya**]-**ko**↑?]
 where-to go-MD experience COP-PST-*C_Q*-*C_{QT/ECHO}*
 ‘Have I ever been to WHERE?’ (Lee 2010: 330)

⁸The particle *-yo* occurs in polite speech, marking that the speaker is being polite and deferential to the addressee. For the sake of simplicity, the polite variant of echo-Qs will not be used in further examples.

However, such expositions are somewhat unsatisfactory because the quotative particle *-ko* cannot freely combine with clauses with sentence-final ending complementizers other than the four plain ones (*-ta*, *-nya*, *-la*, *-ca*). As mentioned in the previous section (fn. 3), Korean has six speech levels, and combining *-ko* with the non-plain sentence-final complementizers produces ill-formed sentences.¹⁰ Ahn (1992) has suggested that subordinate-final complementizers such as the quotative *-ko* cannot combine with sentence-final ending complementizers because the occurrence of a sentence-final ending complementizer indicates that the sentence has ended at that point. Even if the combination is possible, the combination of two complementizers *-ta-ko* ($C_{DC} + C_{QT}$) in echo-Qs seems to have a different function from that in indirect questions such as (14-B), because an echo-Q and an indirect question allows different answers (Lee 1993). For instance, an appropriate answer to (14-B) ‘Did you ask if I have ever been to WHERE/where?’ would be ‘Yes, I did,’ while an appropriate answer to (14-B’) ‘Have I ever been to WHERE?’

⁹While Lee (2010) has claimed that the example in (14-B) undeniably conveys the echo-Q reading, my consultants has stated that (14-B) sounds awkward and barely acceptable as an echo-Q.

¹⁰The following examples illustrate the ill-formedness of the combination of sentence-final declarative ending complementizers other than *-ta* with *-ko*.

- a. Plain *-ta*: Mina-ka koki-lul kacyeo-o-ass-ta-ko↑? ‘Mina brought the meat?’
- b. Intimate *-a/e*: *Mina-ka koki-lul kacyeo-o-ass-e-ko↑?
- c. Familiar *-ney*: *Mina-ka koki-lul kacyeo-o-ass-ney-ko↑?
- d. Blunt *o*: *Mina-ka koki-lul kacyeo-o-ass-o-ko↑?
- e. Polite *-yo*: *Mina-ka koki-lul kacyeo-o-ass-e-yo-ko↑?
- f. Deferential *-(su)p-ni-ta*: *Mina-ka koki-lul kacyeo-o-ass-sup-ni-ta-ko↑?

Noh (1995) has briefly mentioned that the speech level of the subordinate-final endings is levelled out into plain level in indirect speech; further investigation on Korean indirect speech constructions is needed.

would probably be the repetition of the previous utterance (14-A), ‘Have you ever been to Paris?’ Lee (1993) has argued that, since the function and the meaning of *-ta-ko* in echo-Qs are not the same as those in indirect speech, *-tako*-type final endings in echo-Qs should be treated as a distinctive morpheme that is different from that in indirect speech.

What is necessary in the realization of echo-Qs are both the string *-ta(/-nya/-la/-ca)-ko* and the high-rising sentence final intonation (↑). Not all sentences that involve the *-tako*-type final endings are echo-Qs; for instance, *-tako* with falling declarative intonation fails to induce the echo-Q reading, as exemplified in (15-B) with its antecedent (15-A). Likewise, a question that involves the ordinary interrogative complementizer *-ni* with rising echo-Q intonation cannot be interpreted as an echo-Qs, as exemplified in (16-B) with its antecedent (16-A).

(15) *-tako* with falling intonation

A: Mina-ka _{koki-lul} kacyeo-o-ass-ta.
 Mina-NOM meat-ACC bring-come-PST-*C_{DC}*
 ‘Mina brought the meat.’

B: Mina-ka mwue-lul kacyeo-o-ass-**tako**.
 Mina-NOM what-ACC bring-come-PST-*C_{ECHO}*
 ‘Mina didn’t bring anything.’ (*lit.* ‘Mina brought what.’)

(16) *-ni* with rising intonation

A: Mina-ka _{koki-lul} kacyeo-o-ass-ta.
 Mina-NOM meat-ACC bring-come-PST-*C_{DC}*
 ‘Mina brought the meat.’

B: Mina-ka mwue-lul kacyeo-o-ass-**ni**↑?
 Mina-NOM what-ACC bring-come-PST-C_Q
 ‘Did Mina bring something?’

It is impossible to interpret both (15-B) and (16-B) as echo-Qs. (15-B) is interpreted as a negative assertion (see Chae (2019) for the typology of sentence-final *-tako*) which conveys the speaker’s disagreement with the statement in the declarative antecedent, while (16-B) is interpreted as a polar question, invoking the indefinite reading of the *wh*-expression *mwue-lul*.¹¹ Since the complementizer *-tako* (or *-nyako*) and rising intonation jointly trigger the echo-Q reading, this paper will treat the combination of both as the echo-Q complementizer: *-tako*↑/*-nyako*↑.

3.3 A Previously Unnoticed Use of Echo-Qs

A previously ignored, but important property of Korean echo-Qs is that a single echo-Q can be licensed by a declarative sentence containing a list of clauses. For instance, the declarative sentence in (17-A) is made of three coordinated clauses of the kind “X brought Y”, each clause assigning a different value to X and Y. The whole sentence, therefore, makes a list of pairs salient: the first member of the pair always refers to somebody who brought something, while the second member refers to the thing that individual brought.

¹¹In Korean, though indefinites are often realized by attaching the suffix *-nka* to a *wh*-word, bare *wh*-words without *-nka* can be interpreted as indefinites as well, depending on context (e.g., *mwue(s)* ‘what/something’—*mwue-nka* ‘something’, *nwukwu* ‘who/someone’—*nwukwu-nka* ‘someone’, *eti* ‘where/somewhere’—*eti-nka* ‘somewhere’). In this paper, *wh*-words in the examples are assumed not to convey the indefinite reading, unless mentioned otherwise.

Imagine that after A utters (17-A), B realizes that she missed the names of the individuals A mentioned and the names of the food they brought. So she can very naturally ask (17-B).

- (17) A: John-i koki-lul kacyeo-o-ass-ko, Bill-i
 John-NOM meat-ACC bring-come-PST-*C_{CONN}* Bill-NOM
ssal-ul kacyeo-o-ass-ko, Mary-ka yachay-lul
 rice-ACC bring-come-PST-*C_{CONN}* Mary-NOM vegetables-ACC
 kacyeo-o-ass-ta.
 bring-come-PST-*C_{DC}*
- ‘John brought the meat, Bill brought the rice, and Mary brought the vegetables.’
- B: Nwuka mwue-lul kacyeo-o-ass-tako↑?¹²
 who.NOM what-ACC bring-come-PST-*C_{ECHO}*
 ‘WHO brought WHAT?’
- A’: John-i koki-lul, Bill-i ssal-ul, Mary-ka
 John-NOM meat-ACC Bill-NOM rice-ACC Mary-NOM
 yachay-lul (kacyeo-o-ass-tako.)
 vegetables-ACC (bring-come-PST-*C_{RS}*)
- lit.* ‘John the meat, Bill the rice, Mary the vegetables. (John brought the meat, Bill brought the rice, and Mary brought the vegetables.)’

¹²B may use different forms of an echo-Q asking *who brought what*: a connection of three multiple-*wh*-clauses with the echo-Q complementizer *-tako*↑ attached at the end (i), or a single echo-Q that contains multiple *wh*-words in each of the subject and the object positions (ii). As for (ii), my consultants confirmed that it suffices if each of the subject and object *wh*-word is repeated twice, even though the antecedent refers to three individuals each.

- (i) Nwuka mwue-lul kacyeo-o-ass-ko, nwuka mwue-lul
 who.NOM what-ACC bring-come-PST-*C_{CONN}* who.NOM what-ACC
 kacyeo-o-ass-ko, nwuka mwue-lul kacyeo-o-ass-tako↑?
 bring-come-PST-*C_{CONN}* who.NOM what-ACC bring-come-PST-*C_{ECHO}*

A could reply to (17-B) just with a list of pairs like (17-A'). This resembles the well-known pair-list interpretation of multiple-*wh* interrogative clauses.

Dayal (1996: 124) seems to assume that such echo-Qs cannot be licensed, although she does not discuss any specific example. I leave it to future investigation whether an echo-Q like (18-B) can really not be licensed by a discourse-antecedent like (18-A) in English or other languages that are not Korean.

- (18) A: John brought the meat, Bill brought the rice, and Mary brought the vegetables.
 B: WHO brought WHAT?

To sum up, this section has shown that Korean makes a clear morpho-syntactic distinction between 1st-echo-Qs and 2nd-echo-Qs by means of using different complementizers with distinct intonation patterns. The next section turns to a formal analysis of Korean 1st-echo-Qs and 2nd-echo-Qs, the main proposal of the present paper.

-
- lit.* 'WHO brought WHAT, and WHO brought WHAT, and WHO brought WHAT?'
- (ii) [Nwukwu-nwukwu(-nwukwu)]-ka [mwue-mwue(-mwue)]-lul
 [who-who(-who)]-NOM [what-what(-what)]-ACC
 kacyeo-o-ass-tako↑?
 bring-come-PST-*ECHO*
lit. 'WHO WHO (WHO) brought WHAT WHAT (WHAT)? (each who brought each what?)'

All these forms (multiple clauses, multiple-*wh* subject and object, and a single echo-Q) are acceptable in Korean, but the acceptability might be gradual. The present paper will abstract away from this for the sake of simplicity.

4 Compositional Semantics for Korean Echo-Qs

The previous sections have discussed the main characteristics of Korean echo-Qs and highlighted similarities and differences with echo-Qs in English and other languages. This section proposes the first compositional semantic analysis of Korean echo-Qs, an analysis that is able to capture the morpho-syntactic differences between the two main kinds of echo-Qs (1st- and 2nd-echo-Qs) and between echo-Qs and ordinary interrogative clauses, based upon existing analyses of ordinary interrogative clauses (mainly Hamblin 1973 and Karttunen 1977) and of echo-Qs in English or English-like languages, in particular Dayal (1996). I highlight the problems that Dayal's approach faces for Korean and proposes significant changes to her analysis that allow for an account of the observed patterns in Korean echo-Qs. 1st-echo-Qs will be analyzed first; starting from polar echo-Qs (Sec. 4.1.1), followed by single-*wh* echo-Qs (Sec. 4.1.2) and multiple-*wh* echo-Qs (Sec. 4.1.3). Then, 2nd-echo-Qs will be discussed (Sec. 4.2). Lastly, a brief comparison between previous analyses and my analysis will be presented (Sec. 4.3).

4.1 1st-echo-Qs

As discussed in the previous section, there are two types of echo-Qs: 1st- and 2nd-echo-Qs. A 1st-echo-Q requires a declarative sentence conveying a proposition as its antecedent and is marked with the complementizer *-tako*↑.

This section will explore the semantics of polar, single-*wh*, and multiple-*wh* 1st-echo-Qs.

4.1.1 Polar 1st-echo-Qs

This section presents a semantic analysis of polar 1st-echo-Qs in Korean, i.e., echo-Qs that do not contain any *wh*-expression and whose antecedent is a declarative sentence. Polar 1st-echo-Qs are characterized by the same complementizer occurring with *wh*-1st-echo-Qs: *-tako*↑. An example is given in (19-B), while (19-A) shows the declarative clause (with the complementizer *-ta*) acting as the antecedent of the polar echo-Qs. (20) shows the corresponding ordinary polar interrogative clause with the ordinary interrogative complementizer *-ni*.

- (19) A: Mina-ka o-n-**ta**.
 Mina-NOM come-IND-**C_{DC}**
 ‘Mina comes.’
- B: Mina-ka o-n-**tako**↑?
 Mina-NOM come-IND-**C_{ECHO}**
 ‘Mina comes?’¹³
- (20) A: Mina-ka o-**ni**↑?
 Mina-NOM come-**C_Q**
 ‘Does Mina come?’

¹³The English translation of (19-B) is what has been considered as a rising declarative or a declarative question, which can serve functions of interrogatives despite the absence of the subject-auxiliary inversion (Gunlogson 2002). Gunlogson (2002) has claimed that declarative questions are a compositional construction formed by combining a declarative and rising intonation. Given that the Korean sentence (19-B) does not involve a declarative complementizer but an echo-Q complementizer *-tako*↑, it seems more accurate to label

As shown in Sec. 3, the 1st-echo-Q complementizer *-tako*↑ restricts its previously uttered sentence to be a declarative, which in turn requires the answer to the echo-Q to be a set of propositions (type $\langle st, t \rangle$). Since the ordinary interrogative complementizer *-ni* also seeks for a set of propositions, the two complementizers, *-tako*↑ and *-ni*, are distinguished by their presuppositional content; the 1st-echo-Q complementizer *-tako*↑ triggers the presupposition that a relevant sentence *S* whose content is the proposition *p* had been previously uttered, while the ordinary interrogative complementizer *-ni* does not, as made explicit in their logical translations in (21).

- (21) Semantics of complementizers *-ni* and *-tako*↑
- a. Ordinary interrogative complementizer: $\llbracket -ni \rrbracket$
 $\rightsquigarrow \lambda q \lambda p [p = q]$ $\langle st, \langle st, t \rangle \rangle$
- b. 1st-echo-Q complementizer: $\llbracket -tako \uparrow \rrbracket$
 $\rightsquigarrow \lambda q \lambda p : \mathbf{previously-uttered}'(p) . [p = q]$ $\langle st, \langle st, t \rangle \rangle$

(21-b) incorporates the presuppositional content to the logical translation of the 1st-echo-Q complementizer *-tako*↑, by notating the presupposition in bold between a colon and a period (Heim and Kratzer 1998). (21-b) thus indicates

the sentence as an echo-Q, rather than a declarative question. To build a declarative question, the complementizer in (19-B) should be *-ta*; with the rising intonation, then, the sentence will be *Mina-ka o-n-ta*↑? (*lit.*)‘Mina comes?’, which is an acceptable syntactic construction yet does not have the questioning function that English declarative questions have (according to my consultants, the sentence *Mina-ka o-n-ta*↑? can be interpreted as (i) assuring the addressee that Mina comes or (ii) a conditional clause ‘If Mina comes...’ that has to be followed by a consequent clause (e.g., *Mina-ka o-n-ta*↑? *cenpwu kkut-i-ya.* (*lit.*)‘Mina comes? (Then) everything’s over.’)). The present paper will not discuss this further.

that the denotation of *-tako*↑ includes a presupposition that the proposition *p* is in the main logical content of the previously uttered sentence.¹⁴ Since *-tako*↑ seeks for a previously introduced *p* regardless of its truthfulness, echo-Qs do not necessarily denote a set of true answers like Karttunen’s (1977) treatment; rather, they denote a set that contains a proposition that is introduced previously in the discourse. The semantic derivation of the polar echo-Q (18-B) is illustrated below.

(23) Polar 1st-echo-Q

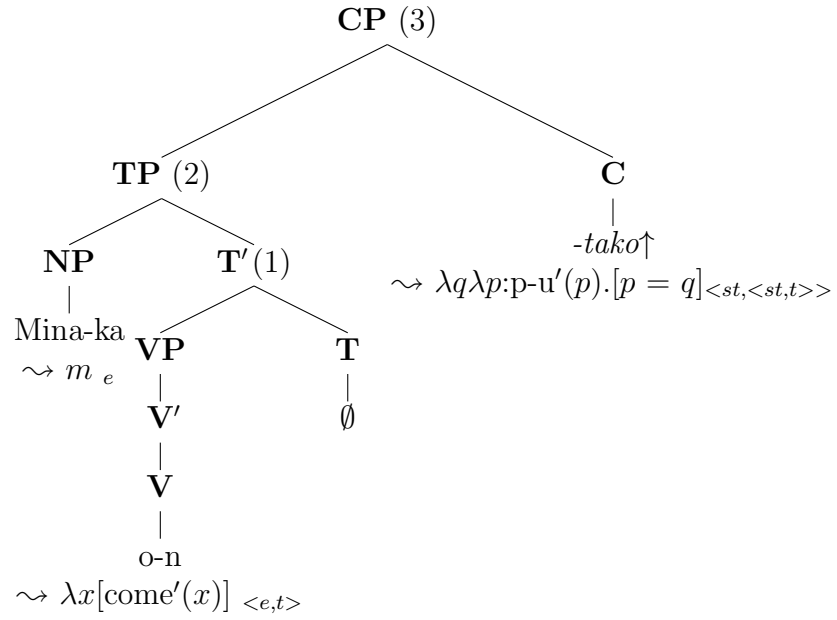
- a. Mina-ka o-n-*tako*↑?
 Mina-NOM come-IND-**C**_{ECHO}
 ‘Mina comes?’

¹⁴Previous studies have claimed that the questioned part (Artstein 2002) or the propositional content (Sudo 2010) of an echo-Q has to be entailed by its preceding utterance. According to their claim, for instance, the echo-Q in the pair below is infelicitous because the entailment is not in the appropriate direction (speaking Uyghur does not entail speaking a foreign language):

- (22) A: John speaks a foreign language.
 B: #John speaks UYGHUR?

Nevertheless, since their claim is built upon only on polar 1st-echo-Qs, further investigation is still needed in order to determine whether the unidirectional entailment is the necessary condition for echo-Qs to be felicitous. Hence, the present paper abstracts away from the entailment and assumes the only necessary condition for the proposition *p* is to be introduced in the previously uttered sentence, following Comorovski (1996) and Dayal (1996).

b.



$$(1) \leadsto \lambda x[\text{come}'(x)] \langle e,t \rangle$$

$$(2) \leadsto \hat{\text{come}}'(m) \langle s,t \rangle$$

$$(3) \leadsto \lambda p:p-u'(p).[p = \hat{\text{come}}'(m)] \langle st,t \rangle$$

4.1.2 Single-*wh* 1st-echo-Qs

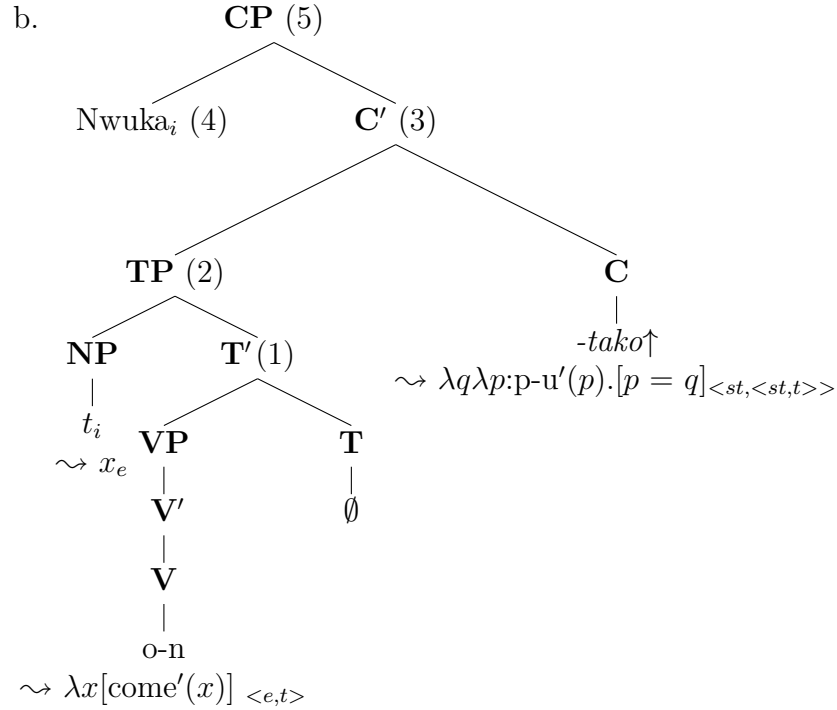
Having seen the semantic derivation of the polar 1st-echo-Q, this section turns to single-*wh* 1st-echo-Qs. As mentioned earlier, 1st-echo-Qs involve the same 1st-echo-Q complementizer *-tako up* regardless of the existence of a *wh*-expression. An example of single-*wh* 1st-echo-Q is shown in (24-B) with a declarative antecedent (24-A). (25) exemplifies the ordinary interrogative counterpart of (24-B).

- (24) A: *Mina-ka o-n-ta.*
 Mina-NOM come-IND-**C_{DC}**
 ‘Mina comes.’
- B: *Nwuka o-n-tako↑?*
 who.NOM come-IND-**C_{ECHO}**
 ‘WHO comes?’
- (25) A: *Nwuka o-ni?*
 who.NOM come-**C_Q**
 ‘Who comes?’

The complementizer in (24-B) is the same 1st-echo-Q complementizer we have seen in the previous section. Therefore, similar to the previous polar 1st-echo-Q example, (24-B) seeks for a set of propositions that contains a proposition conveyed in the previously uttered sentence, such as { $\hat{\text{Mina comes}}$, $\hat{\text{John comes}}$, $\hat{\text{Bill comes}}$ }. The semantic derivation of (24-B) is demonstrated below; the semantics of the *wh*-expression *nwuka* ‘who’ follows Karttunen (1977).¹⁵

- (26) Single-*wh* echo-Q
- a. *Nwuka o-n-tako↑?*
 who.NOM come-IND-**C_{ECHO}**
 ‘WHO comes?’

¹⁵Karttunen (1977) ignores the animate/non-animate distinction between *what* and *who* and treat them as having the same logical translation as *something* and *someone*: $\lambda P \exists x [P(x)]$. In my analysis, nevertheless, the animate/non-animate distinction is maintained in the logical translation of *what* and *who*, for the sake of clarity. Following Karttunen’s *wh*-phrase rule, *what* translates to $\lambda P \exists x [\text{thing}'(x) \wedge P(x)]$ and *who* translates to $\lambda P \exists x [\text{person}'(x) \wedge P(x)]$.



$$(1) \rightsquigarrow \lambda x[\text{come}'(x)]_{\langle e,t \rangle}$$

$$(2) \rightsquigarrow \hat{\text{come}}'(x)_{\langle s,t \rangle}$$

$$(3) \rightsquigarrow \lambda p:p-u'(p).[p = \hat{\text{come}}'(x)]_{\langle st,t \rangle}$$

$$(4) \rightsquigarrow \lambda P \exists x[\text{person}'(x) \wedge P(x)]_{\langle et,t \rangle}$$

$$(5) \rightsquigarrow \lambda p:p-u'(p).\exists(x)[\text{person}'(x) \wedge p = \hat{\text{come}}'(x)]_{\langle st,t \rangle}$$

4.1.3 Multiple-*wh* 1st-echo-Qs

Let us now consider multiple-*wh* 1st-echo-Qs. The derivation of multiple-*wh* 1st-echo-Qs is similar to that of single-*wh* 1st-echo-Qs, except for that there are more than one *wh*-expression in multiple-*wh* 1st-echo-Qs. The same 1st-echo-Q complementizer *-tako*↑ appears in multiple-*wh* 1st-echo-Qs as

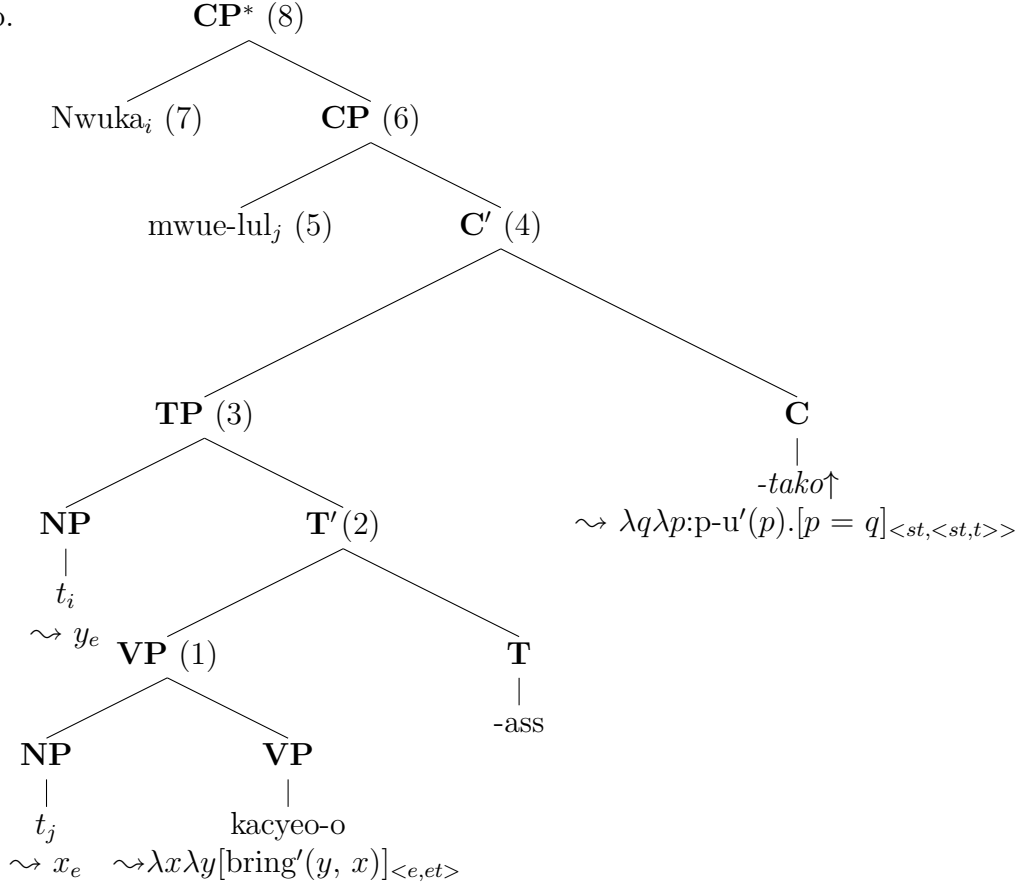
well. (27-B) shows an example of multiple-*wh* 1st-echo-Q, and its antecedent declarative clause is given in (27-A). (28) is an example of the ordinary interrogative counterpart of (27-B).

- (27) A: John-i koki-lul **kacyeo-o-ass-ta.**
 John-NOM meat-ACC bring-come-PST-**C_{DC}**
 ‘John brought the meat.’
- B: Nwuka mwue-lul kacyeo-o-ass-**tako**↑?
 who.NOM what-ACC bring-come-PST-**C_{ECHO}**
 ‘WHO brought WHAT?’
- (28) Nwuka mwue-lul kacyeo-o-ass-**ni**?
 who.NOM what-ACC bring-come-PST-**C_Q**
 ‘Who brought what?’

Again, though both the echo-Q (27-B) and the ordinary interrogative (28) denotes a set of propositions $\langle st, t \rangle$, the denotation of (27-B) has to include a proposition that has been conveyed in the previous utterance due to the presupposition that lies in *-tako*↑. Hence, the denotation of (27-B) would be, for instance, $\{\hat{\text{John brought the meat}}, \hat{\text{Bill brought the rice}}, \hat{\text{Mary brought the vegetables}}\}$, with the underlined proposition being the correct, appropriate answer. The semantic derivation of (27-B) is illustrated below.

- (29) Multiple-*wh* 1st-echo-Q
- a. Nwuka mwue-lul kacyeo-o-ass-**tako**↑?
 who.NOM what-ACC bring-come-PST-**C_{ECHO}**
 ‘WHO brought WHAT?’

b.



- (1) $\sim \lambda y [\text{bring}'(y, x)]_{\langle e, t \rangle}$
- (2) $\sim \lambda y [\text{brought}'(y, x)]_{\langle e, t \rangle}$
- (3) $\sim \hat{\text{brought}}'(y, x)_{\langle s, t \rangle}$
- (4) $\sim \lambda p: p-u'(p). [p = \hat{\text{brought}}'(y, x)]_{\langle st, t \rangle}$
- (5) $\sim \lambda P \exists x [\text{thing}'(x) \wedge P(x)]_{\langle et, t \rangle}$
- (6) $\sim \lambda p: p-u'(p). \exists x [\text{thing}'(x) \wedge p = \hat{\text{brought}}'(y, x)]_{\langle st, t \rangle}$
- (7) $\sim \lambda R \exists y [\text{person}'(y) \wedge R(y)]_{\langle et, t \rangle}$
- (8) $\sim \lambda p: p-u'(p). \exists y \exists x [\text{person}'(y) \wedge \text{thing}'(x) \wedge p = \hat{\text{brought}}'(y, x)]_{\langle st, t \rangle}$

$x)]_{\langle st,t \rangle}$

One thing to note is that Korean multiple-*wh* 1st-echo-Qs may allow multiple propositions as an answer. That is, the same multiple-*wh* 1st-echo-Q (26-B) can be used under the following scenario where its antecedent contains multiple propositions.

- (30) SCENARIO: *Mina threw a potluck party last week. John was not able to attend to it, so Mina describes the party for John. However, John is not familiar with Korean names and dishes.*

M: Seri-nun capchay-lul kacyeo-o-ass-ko, Yoonhee-nun
 Seri-TOP capchay-ACC bring-come-PST-C_{CONN} Yoonhee-TOP
 ttekpokki-lul kacyeo-o-ass-ko, Haena-nun
 ttekpokki-ACC bring-come-PST-C_{CONN} Haena-TOP
 kimpap-ul kacyeo-o-ass-ta.
 kimpap-ACC bring-come-PST-C_{DC}

‘Seri brought capchay, Yoonhee brought ttekpokki, and Haena brought kimpap.’

J: Nwuka mwue-lul kacyeo-o-ass-**tako**↑?
 who.NOM what-ACC bring-come-PST-C_{ECHO}
 ‘WHO brought WHAT?’

Although Mina’s utterance in (30) contains three different propositions, ^Seri brought capchay, ^Yoonhee brought ttekpokki, and ^Haena brought kimpap, John is allowed to use a single echo-Q to ask Mina to repeat or clarify what she said. The answer to John’s echo-Q then has to contain multiple propositions, rather than a single proposition like what (26-B) seeks for. A similar scenario holds for 2nd-echo-Qs; a single 2nd-echo-Q can be used in a context

where the antecedent conveys multiple questions (to be elaborated in Sec. 4.2.3).

Dayal’s (1996) proposal for the echo-Q answerhood condition can account for this interesting property of Korean echo-Qs, by restricting the answer to be a maximally informative proposition. The following is Dayal’s echo-Q answerhood condition:

(31) Echo-Q answerhood condition (Dayal 1996: 124)

$$\text{ANS}_{ECHO}(Q) = \iota p[p \in Q \wedge \text{previously-uttered}'(p)]$$

According to Dayal (1996), (31) applies to the denotation set of an (1st-)echo-Q and picks out a previously uttered, maximally informative proposition as its answer. For example, the possible denotation of multiple-*wh* 1st-echo-Q *nwuka mwue-lul kacyeo-o-ass-tako*↑ ‘WHO brought WHAT?’ is given in (32).

- (32) a. Nwuka mwue-lul kacyeo-o-ass-**tako**↑?
 who.NOM what-ACC bring-come-PST-**C_{ECHO}**
 ‘WHO brought WHAT?’
- b. {^John brought the meat, ^John brought the rice, ^John brought the vegetables, ^Bill brought the meat, ^Bill brought the rice, ^Bill brought the vegetables}
where the antecedent contains a single proposition (26-A)
- c. {^Seri brought capchay and Yoonhee brought ttekpokki and Haena brought kimpap, ^Seri brought ttekpokki and Yoonhee brought capchay and Haena brought kimpap, ^Seri brought kim-

pap and Yoonhee brought ttekpokki and Haena brought kimpap
 ...} where the antecedent contains multiple propositions (29-M)

(32-a) denotes a set that contains a proposition that has been conveyed in the previous utterance. The denotation set of (32-a) is represented as (32-b) under the context where the antecedent has a single proposition, or as (32-c) under the context where the antecedent has multiple propositions. The answerhood condition (31) then applies to the set and looks for a maximally informative proposition that is a member of the set and is conveyed in the previously uttered sentence: the underlined propositions, $\hat{\text{John brought the meat}}$ in (32-b) and $\hat{\text{Seri brought capchay and Yoonhee brought ttekpokki and Haena brought kimpap}}$ in (32-c).

The denotation in (32-c) is based upon Dayal's (2016) function-based approach to pair-list answers to ordinary multiple-*wh* interrogative clauses. In addition to the ordinary interrogative complementizer C^0 , Dayal has assumed a null functional complementizer that takes scope over the object *wh*-expression in a multiple-*wh* interrogative clause such as *who_x brought what?* Under this assumption, the meaning of the object *wh*-expression is interpreted as a Skolem function $f(x)$, with x bound by the universal quantifier, which in turn makes the nucleus of the multiple-*wh* interrogative clause *Who brought what?* as $p = \hat{\text{brought}}'(x, f(x))$. The denotation set of *who brought what?* thus contains multiple propositions each of which represent a graph of the function $f(x)$, such as (32-c).¹⁶ Though Dayal hasn't discussed

¹⁶For more detailed discussion of the functional approach, see Dayal (2016: Ch. 4).

multiple-*wh* echo-Qs with the antecedent containing multiple propositions in her discussion of the functional approach to pair-list answers, my analysis assumes that the echo-Q complementizer triggers the existence of propositions that have been conveyed by the previously uttered sentence in the functional denotation set (as in (32-c)). The answerhood operator then applies to the set and chooses the maximally informative answer to the question.

4.2 2nd-echo-Qs

Having established the semantics of 1st-echo-Qs, this section turns to 2nd-echo-Qs, whose answer is required to be an interrogative sentence conveying a question. The present section will propose the semantics of *-nyako*↑, the 2nd-echo-Q complementizer, distinct from that of *-tako*↑. The proposal will proceed from polar 2nd-echo-Qs to single-*wh* and multiple-*wh* 2nd-echo-Qs.

4.2.1 Polar 2nd-echo-Qs

Polar 2nd-echo-Qs are echo-Qs that contain no *wh*-expressions and whose antecedent is an interrogative sentence. Polar 2nd-echo-Qs are characterized by the complementizer *-nyako*↑, which occurs in *wh*-2nd-echo-Qs as well. An example of a polar 2nd-echo-Q is given in (33-B), while (33-A) shows the ordinary interrogative clause acting as the antecedent.

- (33) A: Mina-ka o-*ni*↑?
 Mina-NOM come-**C_Q**
 ‘Does Mina come?’

- B: Mina-ka o-*nyako*↑?
 Mina-NOM come-**C_{ECHO}**
lit. ‘Does Mina come? (Did you just ask *does Mina come?*)’

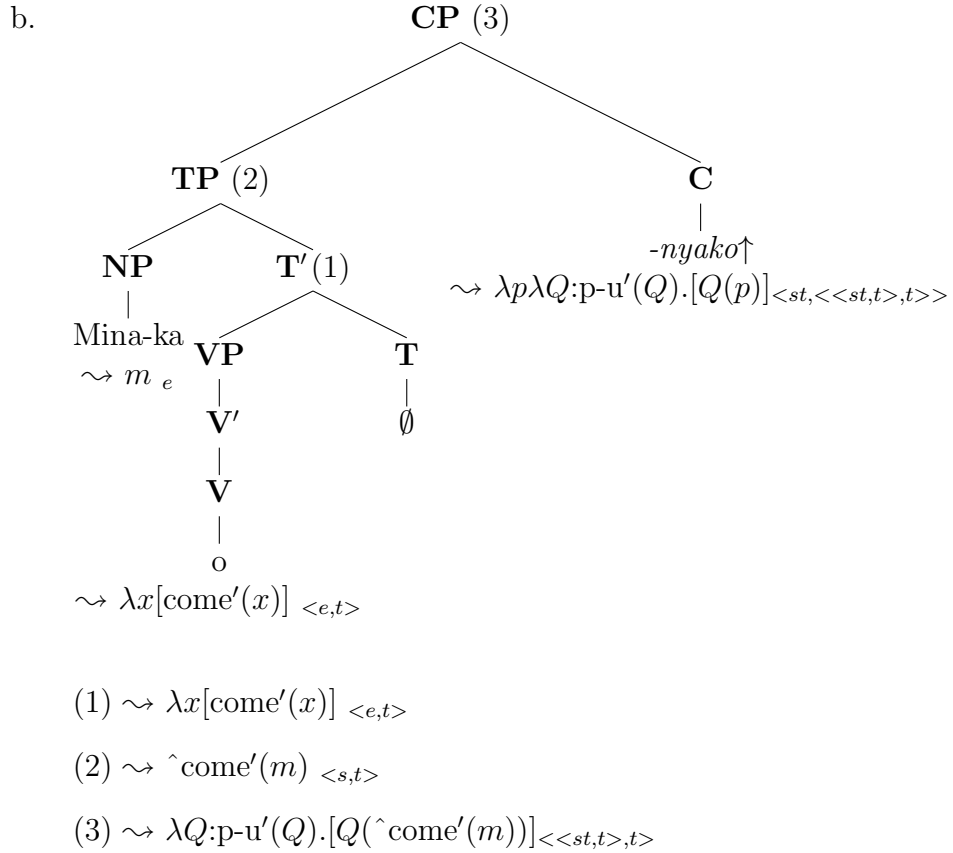
The 2nd-echo-Q complementizer *-nyako*↑ is similar to the 1st-echo-Q complementizer *-tako*↑ in that it presupposes the existence of a previously uttered sentence. The difference between *-tako*↑ and *-nyako*↑ is that *-nyako*↑ restricts its previously uttered sentence to be an interrogative, while *-tako*↑ restricts it to be a declarative. In order to make the difference clear in the semantics of echo-Qs, I suggest the logical translation of *-nyako*↑ as (34-b); for comparison, the logical translation of *-tako*↑ is reiterated in (34-a).

- (34) Logical translations of 1st- and 2nd-echo-Q complementizers
- a. 1st-echo-Q complementizer: $\llbracket -tako\uparrow \rrbracket_{\langle st, \langle st, t \rangle \rangle}$
 $\rightsquigarrow \lambda q \lambda p: \mathbf{previously-uttered}'(p).[p = q]$
- b. 2nd-echo-Q complementizer: $\llbracket -nyako\uparrow \rrbracket_{\langle st, \langle \langle st, t \rangle, t \rangle \rangle}$
 $\rightsquigarrow \lambda p \lambda Q: \mathbf{previously-uttered}'(Q).[Q(p)]$

Each translation involves the presupposition in bold that is triggered by each of the echo-Q complementizers; that is, there exists a previously conveyed proposition *p* (34-a) or a previously conveyed question (in other words, set of propositions) *Q* (34-b). The semantic derivation of the polar 2nd-echo-Q (33-B) is shown below.

- (35) Polar 2nd-echo-Q

- a. Mina-ka o-*nyako*↑?
 Mina-NOM come-**C**_{ECHO}
 ‘Does Mina come?’



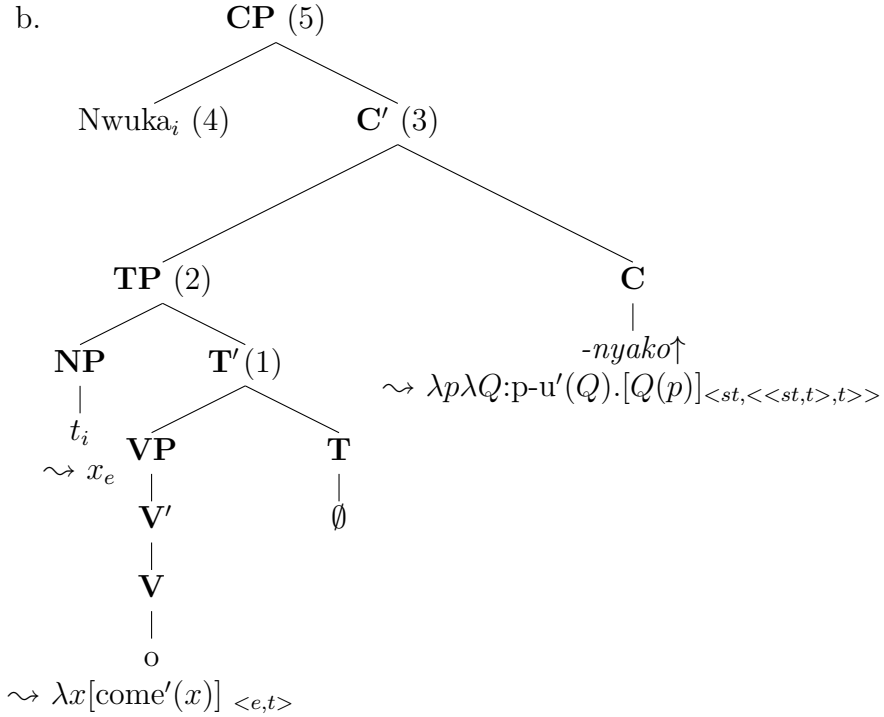
4.2.2 Single-*wh* 2nd-echo-Qs

This section now turns to single-*wh* 2nd-echo-Qs, which involve a single *wh*-phrase and the 2nd-echo-Q complementizer *-nyako*↑. (36-B) is an example of single-*wh* 2nd-echo-Q, and its ordinary interrogative antecedent is given in (36-A).

- (36) A: Mina-ka o-*ni*?
 Mina-NOM come-**C_Q**
 ‘Does Mina come?’
- B: Nwuka o-*nyako*↑?
 who.NOM come-**C_{ECHO}**
lit. ‘Does WHO come?’

With the occurrence of *-nyako*↑, (36-B) seeks for a set of questions that contains a question that is conveyed by the previous utterance. Since a question denotes a set of propositions, the denotation of (36-B) would be similar to the following: $\{\{\hat{\text{Mina comes}}, \hat{\text{John comes}}\}, \{\hat{\text{Mina comes}}, \hat{\text{Bill comes}}\}, \{\hat{\text{Mina comes}}\}\}$. The semantic derivation of (36-B) is demonstrated below; again, Karttunen’s *wh*-phrase rule is adopted for the logical translation of *nwuka* ‘who.’

- (37) Single-*wh* 2nd-echo-Q
- a. Nwuka o-*nyako*↑?
 who.NOM come-**C_{ECHO}**
lit. ‘Does WHO come?’



$$(1) \sim \lambda x [\text{come}'(x)]_{\langle e, t \rangle}$$

$$(2) \sim \hat{\text{come}}'(x)_{\langle s, t \rangle}$$

$$(3) \sim \lambda Q : p-u'(Q) . [Q(\hat{\text{come}}'(x))]_{\langle \langle st, t \rangle, t \rangle}$$

$$(4) \sim \lambda P \exists x [\text{person}'(x) \wedge P(x)]_{\langle et, t \rangle}$$

$$(5) \sim \lambda Q : p-u'(Q) . \exists x [\text{person}'(x) \wedge Q(\hat{\text{come}}'(x))]_{\langle \langle st, t \rangle, t \rangle}$$

4.2.3 Multiple-*wh* 2nd-echo-Qs

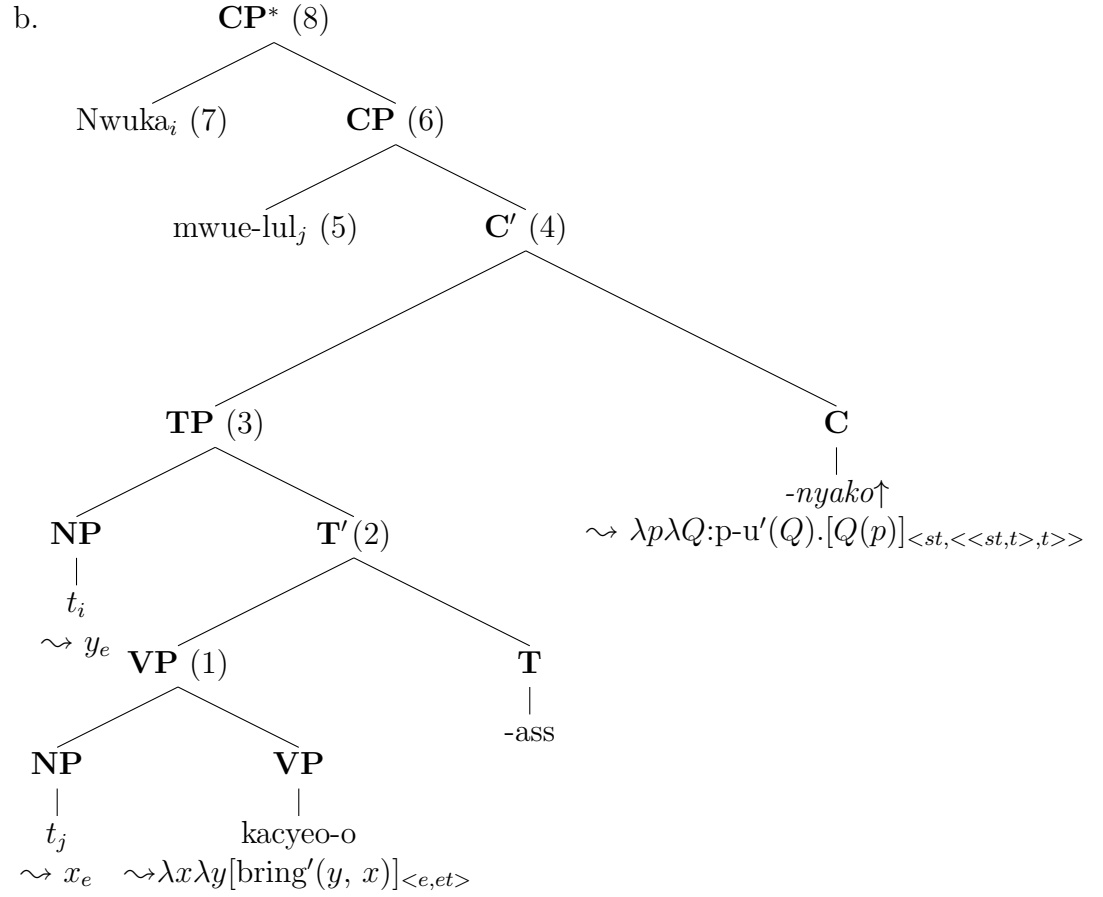
Lastly, this section will discuss the semantics of multiple-*wh* 2nd-echo-Qs, which is similar to that of single-*wh* 2nd-echo-Qs. The same 2nd-echo-Q complementizer *-nyako*↑ appears in multiple-*wh* 2nd-echo-Qs, and the antecedent is required to convey a question in its main logical content. An example of

multiple-*wh* 2nd-echo-Qs is given in (38-B), with its antecedent in (38-A).

- (38) A: Nwuka _{koki-lul} kacyeo-o-ass-***ni***?
 who.NOM meat-ACC bring-come-PST-**C_Q**
 ‘Who brought the meat?’
- B: Nwuka mwue-lul kacyeo-o-ass-***nyako***↑?
 who.NOM what-ACC bring-come-PST-**C_{ECHO}**
 ‘Who brought WHAT?’

The 2nd-echo-Q complementizer 2nd-echo-Q in (38-B) looks for a question in the previous utterance, which must be included in the denotation of (38-B). Then, for instance, (38-B) would denote the following, $\{\{\hat{\text{Mina brought the meat}}, \hat{\text{John brought the meat}}\}, \{\hat{\text{Mina brought the rice}}, \hat{\text{John brought the rice}}\}, \{\hat{\text{Mina brought the vegetables}}, \hat{\text{John brought the vegetables}}\}\}$, with the underline indicating the one conveyed in the previous utterance. (39-b) illustrates the semantic derivation of (38-B).

- (39) Multiple-*wh* 2nd-echo-Qs
- a. Nwuka mwue-lul kacyeo-o-ass-***nyako***↑?
 who.NOM what-ACC bring-come-PST-**C_{ECHO}**
 ‘Who brought WHAT?’



- (1) $\rightsquigarrow \lambda y [\text{bring}'(y, x)]_{\langle e, t \rangle}$
- (2) $\rightsquigarrow \lambda y [\text{brought}'(y, x)]_{\langle e, t \rangle}$
- (3) $\rightsquigarrow \hat{\text{brought}}'(y, x)_{\langle s, t \rangle}$
- (4) $\rightsquigarrow \lambda Q : p-u'(Q) \cdot [Q(\hat{\text{brought}}'(y, x))]_{\langle \langle st, t \rangle, t \rangle}$
- (5) $\rightsquigarrow \lambda P \exists x [\text{thing}'(x) \wedge P(x)]_{\langle et, t \rangle}$
- (6) $\rightsquigarrow \lambda Q : p-u'(Q) \cdot \exists x [\text{thing}'(x) \wedge Q(\hat{\text{brought}}'(y, x))]_{\langle \langle st, t \rangle, t \rangle}$
- (7) $\rightsquigarrow \lambda R \exists y [\text{person}'(y) \wedge R(y)]_{\langle et, t \rangle}$
- (8) $\rightsquigarrow \lambda Q : p-u'(Q) \cdot \exists y \exists x [\text{person}'(y) \wedge \text{thing}'(x) \wedge Q(\hat{\text{brought}}'(y, x))]$

$x))\}_{\langle\langle st,t\rangle,t\rangle}$

As mentioned Sec. 4.1.3, a single 2nd-echo-Q can be used under the context where its antecedent contains multiple questions. Consider the following scenario.

- (40) SCENARIO: *Mina threw a potluck party last week. John was there and some of the dishes impressed him very much. Thus, he asks Mina about who brought them to the party. Mina fails to hear some parts of John's question because an ambulance was passing by with the siren on.*

J: Nwuka capchay-lul kacyeo-o-ass-ko, nwuka
 who.NOM capchay-ACC bring-come-PST-C_{CONN} who.NOM
 ttekpokki-lul kacyeo-o-ass-ko, nwuka kimpap-ul
 ttekpokki-ACC bring-come-PST-C_{CONN} who.NOM kimpap-ACC
 kacyeo-o-ass-ni?
 bring-come-PST-C_Q

‘Who brought capchay, who brought ttekpokki, and who brought kimpap?’

M: Nwuka mwue-lul kacyeo-o-ass-**nyako**↑?
 who.NOM what-ACC bring-come-PST-C_{ECHO}
 ‘Who brought WHAT?’

A single multiple-*wh* 2nd-echo-Q is used under the above scenario, even though the preceding utterance conveys three different questions: who brought capchay, who brought ttekpokki, and who brought kimpap. Hence, the answer to Mina’s echo-Q must contain multiple questions rather than a single question.

Dayal’s (1996) answerhood condition, as it picks out a maximally infor-

mative proposition from the denotation of 1st-echo-Q, can select a maximally informative question from the denotation of 2nd-echo-Q, though a slight modification is needed in order to accommodate the type of the answer required for 2nd-echo-Qs: questions. The following is the answerhood condition for 2nd-echo-Qs, built upon Dayal (1996).

(41) 2nd-echo-Q answerhood condition

$$\text{ANS}_{ECHO}(Q) = \iota P[P \subset Q \wedge \text{previously-uttered}'(P)]$$

(41) seeks for a previously conveyed, maximally informative unique question (set of propositions) that is a member of the denotation of a 2nd-echo-Q. Therefore, regardless of whether the antecedent conveys a single question, (41) can pick out a maximally informative answer from the denotation set. For example, (42-b) is the denotation of a multiple-*wh* 2nd-echo-Q (42-a) under the scenario where its antecedent conveys only one question, while (42-c) is the denotation under the scenario where its antecedent conveys multiple questions.

- (42) a. Nwuka mwue-lul kacyeo-o-ass-***nyako***↑?
 who.NOM what-ACC bring-come-PST-**C_{ECHO}**
 ‘Who brought WHAT?’
- b. {who brought the meat?, who brought the vegetables?, who brought the rice?}
- where the antecedent contains a single question (37-A)*
- c. {who brought capchay and who brought ttekpokki and who

brought kimpap?, who brought capchay and who brought kimpap?, who brought ttekpokki and who brought kimpap? ...}
where the antecedent contains multiple questions (41-J)

The answerhood condition (41) applies to each of the denotations (42-b-c) and selects a maximally informative question: the underlined questions, *who brought the meat?* in (42-b) and *who brought capchay and who brought ttekpokki and who brought kimpap?* in (42-c).

4.3 Problems with existing analysis

As introduced earlier, English 1st- and 2nd-echo-Qs share the same morpho-syntactic structure. All echoed *wh*-expressions remain in-situ in each type of echo-Qs and there is no overt distinction between the types, as exemplified in (43) and (44).

(43) English 1st-echo-Q (reiterated from (10))

A: Mina brought the meat.

B: Mina brought WHAT?

(44) English 2nd-echo-Q (reiterated from (11))

A: Who brought the meat?

B: Who brought WHAT?

Dayal (1996) has suggested a unified approach to the derivation of both 1st- and 2nd-echo-Qs, by proposing a covert echo operator OP_{ECHO} that takes

scope over CP, in which both 1st- and 2nd-echo-Qs are allowed. In addition, the echoed *wh*-expression in 2nd-echo-Qs is assumed to be a free variable, whereas the non-echo *wh*-expression is existentially bound; the free variable introduced by the non-echo *wh*-expression is bound when OP_{ECHO} combines with CP. The definition of OP_{ECHO} is given in (45-a), while the derivation of the 1st-echo-Q *Monica likes WHAT?* is briefly demonstrated in (45-b) and that of the 2nd-echo-Q *What does WHO like?* is in (45-c).

- (45) Dayal's (1996) uniform approach
- a. $[[OP_{ECHO}]] \rightsquigarrow \lambda Z \lambda Q [\exists x_1 \dots \exists x_n [Q = Z(x_1) \dots (x_n)]]$
 - b. $[[_{CP^*} OP_{ECHO} [_{CP} \text{Monica likes WHAT?}]]]$
 $\rightsquigarrow \lambda Q [\exists x [Q = \hat{\text{likes}}'(Monica, x)]]$
 - c. $[[_{CP^*} OP_{ECHO} [_{CP} \text{What does WHO like?}]]]$
 $\rightsquigarrow \lambda Q [\exists x [Q = \lambda p [\exists y [\text{person}'(y) \wedge p = \hat{\text{likes}}'(y, x)]]]]$

Dayal's OP_{ECHO} has a number of caveats. First of all, since the operator itself does not distinguish between 1st-echo-Qs and 2nd-echo-Qs, it is at odds with Korean, which makes a morpho-syntactic distinction between the two types of echo-Qs. For instance, Korean counterparts of English *Monica likes WHAT?* and *What does WHO like?* do not use the same complementizer as each other. As explained in the previous sections, *-tako*↑ is used for the former, while *-nyako*↑ is used for the latter. The OP_{ECHO} operator cannot reflect any distinction between 1st- and 2nd-echo-Qs that rises from morpho-syntactic restrictions. Secondly, Dayal's OP_{ECHO} crucially requires

wh-expressions in echo-Qs to have a different lexical meaning from those in ordinary interrogative clauses, despite the fact that they are morphologically the same. For instance, the echoed *wh*-expression *what* in *Monica likes WHAT?* is considered as a free variable, while the non-echo *wh*-expression *what* in *What does WHO like?* is considered as an existentially bound variable, even though they are the same *wh*-expression. Lastly, Dayal treats the echo-Q complementizers as triggering a completely different semantic operation from the ordinary interrogative complementizer. However, as shown in my analysis, the 1st-echo-Q complementizer and the ordinary interrogative complementizer are logically the same; the only difference between them is the presuppositional content. Therefore, it is not necessary to set up a whole new operator for echo-Qs.

Considering the overt morpho-syntactic distinction between 1st- and 2nd-echo-Qs, what seems to be a better fit for Korean than Dayal's OP_{ECHO} is Comorovski's (1996) analysis of echo-Qs. Comorovski (1996) has proposed two primitive relations A and Q, A representing the assertion relation between a proposition and context and Q representing the asking relation between a set of propositions (a questions) and context. $A(p, c)$ means that the proposition p has been asserted in the context previously, while $Q(Q, c)$ means that the question Q has been asked in the context previously. (46) shows the logical translation of the 1st-echo-Q *Monica likes WHAT?* while (47) shows the logical translation of the 2nd-echo-Q *what does WHO like?* (Comorovski 1996).

(46) Comorovski's analysis of English 1st-echo-Q

[[Monica likes WHAT?]]

$\rightsquigarrow \lambda p \exists x [A(p, c) \wedge p = \hat{\text{likes}}'(Monica, x)]$

(47) Comorovski's analysis of English 2nd-echo-Q

[[What does WHO like?]]

$\rightsquigarrow \lambda Q \exists y [Q(Q, c) \wedge Q = \lambda p \exists x [\sim p \wedge p = \hat{\text{likes}}'(x, y)]]$

As shown above, Comorovski has made distinction between 1st-echo-Qs and 2nd-echo-Qs, treating both echoed and non-echoed *wh*-expressions as having the same Karttunen-style meaning (existentially quantified variable). Though Comorovski's analysis is similar to my analysis, it is still unsatisfactory in that the two relations A and Q assume the semantic operations for echo-Qs are completely different from the operation for ordinary interrogative clauses.

Therefore, existing semantic analyses of echo-Qs do not offer an adequate and accurate explanation for Korean. The proposal of the present paper, instead, does not face any of those issues by mapping different complementizers onto different operators, assuming some of them (the 1st-echo-Q complementizer and the ordinary interrogative complementizer) share the same semantic content and differ only in presuppositional content, as has been already shown in the previous sections.

4.4 Summary

Throughout Sec. 4, it has been explained that Korean echo-Qs restrict the semantic type of possible answers by using different complementizers for 1st- and 2nd-echo-Qs. The 1st-echo-Q complementizer *-tako*↑ allows for proposition(s), while the 2nd-echo-Q complementizer *-nyako*↑ allows for set(s) of propositions. This section has attempted to provide a novel compositional analysis by defining *-tako*↑ as of type $\langle st, \langle st, t \rangle \rangle$ and *-nyako*↑ as of type $\langle st, \langle \langle st, t \rangle, t \rangle \rangle$. By doing so, the analysis has succeeded in producing correct denotations of 1st- and 2nd-echo-Qs: a set of propositions $\langle st, t \rangle$ and a set of sets of propositions $\langle \langle st, t \rangle, t \rangle$, respectively. Rather than taking a uniform approach to both types of echo-Qs, the distinction proposed in this section allows more precise understanding of the semantics of Korean echo-Qs.

5 Conclusion

The present paper aimed to examine the behavior of echo-Qs in Korean and to propose the first compositional semantic analysis of Korean echo-Qs. This paper has shown that Korean echo-Qs, even though they are similar to English echo-Qs in that they mimic the previously uttered sentence, are crucially different from English due to the clear morphological distinction between ordinary interrogative clauses and echo-Qs by using different complementizers: *-ni* in ordinary interrogative clauses and *-tako*↑ and *-nyako*↑

in 1st- and 2nd-echo-Qs. This paper has proposed that the ordinary interrogative and the 1st-echo-Q complementizers are associated with the same semantic operation, $\lambda q\lambda p[p = q]$, and are different in their presuppositional content: no presupposition is triggered by the ordinary interrogative complementizer, while a presupposition that the denotation of the echo-Q has been previously introduced in the discourse is triggered by the 1st-echo-Q complementizer. The 2nd-echo-Q complementizer shares the same presuppositional content with the 1st-echo-Q complementizer, while it is associated with a different semantic operation, $\lambda p\lambda Q[Q(p)]$. The contribution of this study has been to provide insights to our knowledge of echo-Qs from the perspective of a language that cannot be fully understood by existing theories, which have heavily relied on Indo-European languages. Further investigation into some important issues that this paper could only touch on, in particular the precise nature of the relation between an echo-Q and its discourse antecedent and pair-list echo-Qs, could shed more light on our understanding of echo-Qs. Though the analysis in this study heavily focuses on Korean, further research might explore whether the analysis can successfully account for other languages such as Japanese, which is a language that uses different markers for ordinary interrogative clauses, 1st-echo-Qs, and 2nd-echo-Qs.

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