

# Modeling Answering Strategies for the Polar Questions across Languages

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## Abstract

This paper provides a discourse-based account of polar questions and answering particles. Arguing against syntax-based ellipsis analyses, the paper suggests that polarity particles are anaphoric in nature and their interpretation is determined by the antecedent evoked by the context. It also suggests that the parametric differences between the polarity-based (e.g., English, Swedish, German) and the truth-based answering system (e.g., Korean, Chinese, Japanese) have to do with the tight interactions between the anaphoric nature of answering particles and discourse.

## 1 Introduction

Polar questions and responses by answering particles like *yes* and *no* are everyday interactions between interlocutors in daily language uses (see, among others, Jones 1999, Holmberg 2016, Krifka 2013, Fretheim 2017):

- (1) A: Are we invited?  
 B: Yes. (=You are invited.)  
 B': No. (=You are not invited.)
- (2) A: Aren't you tired today?  
 B: (#)Yes. (=I am tired today.)  
 B': No. (=I am not tired today.)

The answering particle *yes* or *no* here serves as a proper response to the polar questions, assigning proposition-like meanings as given in the parentheses.

In addition to this analytic question of how a single particle induces a sentential interpretation, an ensuing question arises from language differences in the responses to negative questions. Consider the exchanges in (2) and corresponding Korean examples in the following (see Kim 2017):

- (3) A: ne onul an phikonhay?  
 you today not tired?  
 'Aren't you tired today?'  
 B: Ung. 'yes' (=I am not tired.)  
 B': Ani. 'no' (=I am tired today.)

As seen from the contrast between English and Korean, the meaning of *yes* differs. In English, the response *yes* confirms the positive proposition of the question while the corresponding *yes* in Korean confirms the negative proposition denoted by the question. Such a difference distinguishes the polarity-based answering system from the truth-based answering system (Jones 1999).

This paper tries to offer a discourse-based approach to account for these two as well as related questions. The paper argues that the propositional meaning of the answering particles is not derived from syntactic operations like movement-and-deletion. It rather has to do with the anaphoric nature of the answering particles (Ginzburg and Sag 2000, Farkas and Bruce 2010, Krifka 2013, Roelofsen and Farkas 2015). It also shows that the parametric differences between the two different types of answering system, the polarity-based system (e.g., English, Swedish, German) and the truth-based system (e.g., Korean, Chinese, Japanese), are due to tight interactions between the anaphoric nature of answer particles and discourse. The paper then shows how this

intuitive idea can be modeled within the grammar of HPSG (Head-driven Phrase Structure Grammar).

## 2 Some key features in polar questions and responses

### 2.1 Parametric differences and language variations in polar questions

As noted in the beginning, there are four main ways of polar questions with responses. Each of the positive and negative polar questions can employ *yes* or *no* as their responses. These particles can be followed by an elliptical or full sentence, as seen from the following examples:

- (4) Q: Belgian ba si Paul? (Tagalog)  
 Belgian is Paul  
 ‘Is Paul Belgian?’  
 A: Oo, Belgian siya. ‘Yes, he’s Belgian.’  
 A’: Hindi’, hindi’ siya Belgian. ‘No, he isn’t Belgian.’

As seen earlier, parametric variations among languages come from responses to negative questions. Consider Swedish and Japanese examples (data from Holmberg 2016):

- (5) Q: Är du inte trött? (Swedish)  
 are you not tired  
 ‘Are you not tired?’  
 A: Nej (jag är inte trött)  
 no I am not tired  
 ‘No (I’m not tired)’  
 (6) Q: kimi tukarete nai (Japanese)  
 you tired not  
 ‘Are you not tired?’  
 A: hai/un ‘yes’ (=I am not tired.)

As illustrated here, the key difference between the two languages is that in languages with the polarity system (e.g., Swedish), the negative particle *no* means the speaker’s agreement with the negative proposition. However, in languages with the truth-based system (e.g., Japanese), it is the positive particle *yes* that is employed for the agreement with the negative proposition denoted by the negative question.

A complication arises in languages that allow three-valued responses to polar questions. Languages like Swedish, Danish, Norwegian, French,

German, and Old English allow one negative response word and two affirmative particles. For instance, in Swedish, there are two positive answer particles, *ja* and *jo*, and one negative answer particle *nei*. The key difference between *ja* and *jo* lies in the presupposition of the polar question. Observe the following Swedish examples (data from Fretheim 2017):

- (7) A: drack du inte upp ditt kaffe?  
 drank you not up your coffee  
 ‘Did you not drink up your coffee?’  
 B: nej. ‘No. (I didn’t.)’  
 B’ #ja.  
 B’’ jo. ‘Yes. (I did.)’

The polar question is negative, *ja* is not natural since it requires the antecedent to presuppose a positive polarity proposition, while *jo* is a proper one which intends to deny A’s negative proposition.

In addition, note that answers to polar questions can vary. In particular, in languages like Korean and Finnish, polar questions can be answered by echoing the verb in the polar question:

- (8) Q: ku chinkwu hakhoy-ey  
 the friend conference-to  
 o-ass-e?  
 come-PST-QUE  
 ‘Did the friend come to the conference?’  
 A: ung. o-ass-e.  
 yes. come-PST-DECL  
 ‘Yes. (They) came.’  
 A’: an o-ass-e.  
 not come-PST-DECL  
 ‘(They) didn’t come.’

When the answer is a negative proposition, the prefix negator *an* is employed.

## 3 Syntax-based Analyses

### 3.1 Arguments for syntax-based analysis

The first key question in the analysis of answering systems to polar questions concerns how answering particles like *yes* and *no* can have sentential interpretations. Kramer and Rawlins (2011) and Holmberg (2013, 2016) suggest that the particles *yes* and *no* contain clausal structure that undergoes PF-deletion, assimilating them to elliptical constructions such as

fragment answers. In particular, Holmberg (2016), adopting the movement-deletion approaches for elliptical constructions suggested by Merchant (2001, 2004) and subsequent work, suggests that the stand-alone answer particle as well as echoed verb are derived from clausal ellipsis as represented in the following:

- (9) Q: Did the student come?  
 A: Yes. [~~The student came.~~]  
 A': o-ass-e [ku haksayng  
 come-PST-DECL the student  
 t].(Korean)  
 'Yes. The student came.'

To insure answering particles to get the proper interpretations, Holmberg suggests that polar questions all introduce a polarity variable functioning as the head of PolP as given in (10):

- (10) [<sub>CP</sub> Did[±Pol] [<sub>PolP</sub> the student [±Pol] [<sub>VP</sub> come]]]

Accepting Hamblin's (1973) view that polar questions are propositional abstracts (having the set of alternative propositions  $p$  and  $\neg p$ ), Holmberg (2016) suggests that polar questions like (10) evoke the variable Pol with two possible values: (10) in turn then means 'What is the value of [± pol] such that the student came?' The answer particle functions as binding the polarity variable:

- (11) [<sub>FoCP</sub> yes[+Pol] [<sub>PolP</sub> the student [+Pol] [<sub>VP</sub> came]]]

The answer particle positioning in the Spec of Focus in the CP domain assigns either affirmative (for *yes*) or negative value (for *no*) to the polarity variable of the head Pol. The PolP then undergoes ellipsis, subject to the LF-identity condition between the antecedent and the elided part.

Holmberg's analysis offers a simple account for the examples including the one in (8) where the polarity value of the answering particles matches that of the polar question. Consider another matching example where a negative polar question is answered with the negative particle:

- (12) Q: Isn't Alfonso coming to the party?

- A: No. (= he isn't coming to the party?)

In Holmberg's analysis, the answer *no* carries the negative polarity value and thus assigns negative value to the head PolP. This yields a desired sentential interpretation.

### 3.2 Issues in syntax-based analyses

As just have earlier, the interplay of the syntactic constraints and ellipsis seems to work well for such cases, but one immediate question arises with respect to instances where the polarity value of the answer particle does not match with that of the putative antecedent linked to the polar question.

- (13) Q: Does he drink coffee?  
 A: No (Nope). (=He doesn't drink coffee.)  
 (14) Q: Doesn't he drink coffee?  
 A: Yes, (he does).

For instance, the condition with the antecedent in (13) assigns a 'positive' value to the head of PolP because of the positive statement, but then there is a feature clash with the 'negative' value of the particle *no*. The escape hatch Holmberg (2016) adopts is that the negative feature of the negative particle is interpretable while the one in the putative clause is uninterpretable (because of its antecedent). In examples like (14), *yes* functions as an affirmative focus operator which has no variable to bind since the antecedent is already marked negative. The deletion of PolP would then give an unwanted interpretation. The suggested solution is to alternatively allow TP ellipsis under identity with TP of the antecedent.

Another issue arises from languages with three-valued response systems. As noted earlier, the Scandinavian languages (Swedish, Norwegian) as well as Indo-European languages like French and German have one negative answering particle and two positive ones. This three-valued system undermines the two-valued, syntactic analysis (e.g., Kramer and Rawlins 2011, Holmberg 2013, 2016) in which the deletion relies on the LF-identity between the antecedent of the polar question and the elided part. Consider the following French data (Ginzburg and Sag 2000):

- (15) Q: est ce que Mimi est sérieuse?  
 'Is Mimi diligent?'

A: oui/non

- (16) a. est ce que Mimi n'est pas sérieuse  
'Isn't Mimi diligent?'

A: \*oui/si/non

As seen from the data, French has three answering particles: one negative particle *non* and two positive answering particles *oui* and *si*. The particle *oui* requires a positive discourse antecedent while *si* presupposes a negative one (see Ginzberg and Sag 2000 also). This indicates that the answering system needs to refer to discourse information.

Within this type of syntax-based ellipsis analysis, it is crucial to identify the linguistic antecedent linked to the answer. However, note examples like (17) where particle is used with exophoric antecedent (Tian and Ginzburg 2016):

- (17) (Context: A child is about to touch the socket.) Adult: No!

There is no syntactic identity condition that we can refer to here. It is not possible to identify any overt antecedent at syntax.

### 3.3 Language variations: polarity and truth-based systems

As we have seen earlier, with respect to answering negative polar questions, there are two different answering systems, polarity-based and truth-based ones. Holmberg (2013, 2016) attributes the difference of these two systems to different positions of negation in each language. Holmberg's key suggestion is three different types of negation across languages: high, middle, and low negation.

- (18) [<sub>CP</sub> Foc not [<sub>PolP</sub> [<sub>±Pol</sub>] [<sub>TP</sub> ... [<sub>NegP</sub> not [<sub>VP</sub> not ... ]]]]]

Holmberg suggests that in languages like Cantonese or Korean, the negation is assumed to be within a VP so that it does not affect the Pol value. That is, the particle answer *yes* with the interpretation of *yes, she is not diligent* would not cause any feature clash in the polarity value. Holmberg claims that with this low negation, negation is "distance enough from the unvalued sentential polarity head not to assign value to it". However, in English, the negation in such a case is in high position, and *yes* cannot be linked

to the negative proposition: it must be linked to the positive proposition such that *yes she is diligent*.

Holmberg's system thus suggests that the language with the truth-based system has only low negation. However, in languages like Cantonese, Japanese, and Korean, there are surely examples where the negation is in high position, but still induces the truth-based system (Kim 2016). For instance, the negative copula *ani-ta* 'not-DECL' in Korean is clearly in the high position with respect to the main proposition in question:

- (19) a. Mimi-ka pwucilenha-n kes ani-ci?  
Mimi-NOM diligent-MOD thing not-QUE  
'Is it not the case that Mimi is diligent?'
- b. Ung. 'Yes' (=Mimi is not diligent)

In this example, the negative copula combines with the clause of Mimi's being diligent. The clause introducer *kes* ensures the copula negation in the high position, but the affirmative answer just affirms the negative proposition.<sup>1</sup> Holmberg (2016: 199), recognizing such a problem for a similar example in Japanese, suggests that such an example involves the high negation as in English.

As the nature of the two answering systems tells us, in the polarity-based system, when the English speaker answers a polar question, the affirmative particle is linked to the truth of the situation under discussion (not the denotation of the polar question) while the negative one is linked to the falsity of the proposition denoted by the situation. Meanwhile, within the truth-based system, the affirmative particle affirms the denotation of the polar question (true or false situation) while the negative particle denies this denotation. This means that what matters is the anaphoric nature of answering particles in each language (mainly two types), not the position of the negation.

## 4 Modeling a discourse-based interactive approach

### 4.1 Base-generation and interpretation

The starting point of our analysis is to assume that polar questions and answers particles as response

<sup>1</sup>The expression *kes* in such an example is often taken to be a sentential nominalizer or complementizer. See Kim (2016).

involve no ellipsis but are generated ‘as is’.<sup>2</sup> The stand-alone response particles obtain their interpretations on the basis of the surrounding context. In terms of semantics, polar questions are traditionally taken to introduce two propositions, one and the negation of the other ( $p$  and  $\neg p$ ). The response particles *yes* and *no* confirm the truth of these two values (Hamblin 1973, Farkas and Bruce 2010, Krifka 2013, among others).

Different from the traditional view, we, following the idea of Ginzburg and Sag (2000), accept the view that questions are taken as propositional abstracts and polar questions are 0-ary proposition abstracts in which the set of abstracted elements is the empty set as given in (20a) (Ginzburg and Sag 2000, Kim 2016). The semantic content of polar questions can also be represented in terms of lambda calculus and simplified feature structures for the question *Is Mimi diligent?*<sup>3</sup>

- (20) a. Is Mimi diligent?  
 b.  $\lambda \{ \} [\text{diligent}(m)]$   
 c.  $\left[ \text{SEM} \left[ \begin{array}{l} \text{question} \\ \text{PARAMS } \{ \} \\ \text{PROP } \left[ \begin{array}{l} \text{QUANTS } \langle \rangle \\ \text{NUCL } [\text{diligent}(m)] \end{array} \right] \end{array} \right] \right]$

Polar questions are thus treated uniformly in terms of an empty PARAMS (parameter) value, but asking the truth value of the propositional (PROP) meaning.<sup>4</sup>

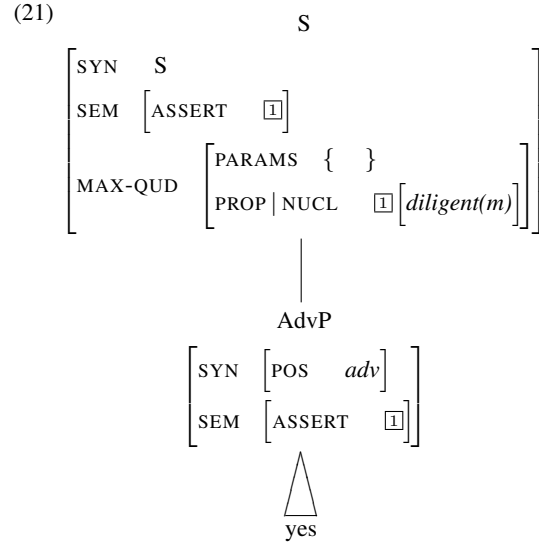
As for the syntax of the isolated answer particle functioning as a response to the polar question, we follow the analyses of Ginzburg and Sag (2000) and take the particle as well as other short answers to be

<sup>2</sup>Much of the analysis here is developed from Kim (2017).

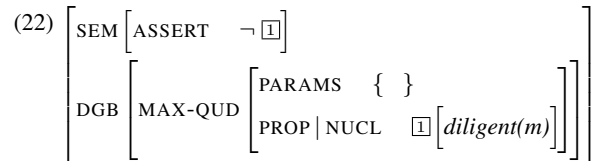
<sup>3</sup>The message or an utterance denotes a *proposition*, *outcome*, *fact*, or *question*. For example, the content of the sentence *Mimi is diligent* is a proposition whose truth or falsity directly involves the real world. And the content of *whether Mimi is diligent* is a question which is resolved according to whether the proposition is true or false. By contrast, the meaning of an imperative sentence like *Leave on time!* makes reference to future outcomes involving the hearer’s leaving while exclamative sentences like *What a nice hat you have!* denote a fact. See Ginzburg and Sag (2000) for details.

<sup>4</sup>The feature QUANTS take a list of quantifiers as value while the feature NUCL takes an element of type relation as its value.

a complete, non-sentential constituent. Expressions like *yes*, *maybe*, *probably*, *sure*, *right*, and so forth, can have stand-alone uses with a complete propositional meaning. These expressions behave like adverbials, but have a propositional semantic content, constructed from a polar question. An appropriate response will function as the propositional abstract, yielding the value  $p$  or its negation  $\neg p$  (e.g.,  $\{r | \text{SimpleAns}(r, \lambda \{ \} p)\} \{p, \neg p\}$ ). For example, the answer particle *yes* will have the following semantic contents:



As given here, the answering particle *yes*, functioning as an adverbial expression in the independent clause, represents a complete meaning identified with the propositional meaning of MAX-QUD (maximal question-under-discussion). The contextual information contains the attribute MAX-QUD, whose value is of type question and represents the question currently under discussion. The stand alone *no* will have the similar structure and semantic composition. The only difference lies in the semantics:



The meaning of *yes*, as given in (21), is asserting the value  $\boxed{1}$  which is identical with the propositional meaning of the MAX-QUD, which is constructed from a polar question in the context. That

is, the particle picks up the nucleus of the propositional meaning from the MAX-QUD and asserts it. The particle *no* differs from *yes* in that its semantic content is asserting the negative value of the propositional nucleus meaning that has no quantification information.

#### 4.2 Answering a negative question in the polarity-based system

The analysis for answering a negative question is not different from the one for answering a positive question we have just seen. For instance, the semantic content for *Isn't he gentle?* would be something like the following:

$$(23) \text{ a. } \lambda\{ \}[\neg\text{gentle}(i)]$$

$$\text{ b. } \left[ \text{SEM} \left[ \begin{array}{l} \text{question} \\ \text{PARAMS } \{ \} \\ \text{PROP } \left[ \begin{array}{l} \text{QUANTS } \langle \text{not-rel} \rangle \\ \text{NUCL } [\text{gentle}(i)] \end{array} \right] \end{array} \right] \right]$$

Uttering such a negative question would evoke the MAX-QUD to include a propositional meaning with the quantification information. We have noted that the semantic content of *yes* and *no* as a response to a positive proposition is to confirm or disconfirm not the propositional meaning, but the nucleus meaning of the proposition, not referring to the quantification information.

$$\left[ \begin{array}{l} \text{FORM } \langle \text{yes} \rangle \\ \text{SEM} \left[ \text{ASSERT } \boxed{1} \right] \\ \text{DGB} \left[ \text{MAX-QUD} \left[ \begin{array}{l} \text{PARAMS } \{ \} \\ \text{PROP } \left[ \begin{array}{l} \text{QUANTS } \langle \text{not-rel} \rangle \\ \text{NUCL } \boxed{1} [\text{gentle}(i)] \end{array} \right] \end{array} \right] \right] \end{array} \right]$$

$$\left[ \begin{array}{l} \text{FORM } \langle \text{no} \rangle \\ \text{SEM} \left[ \text{ASSERT} \neg \boxed{1} \right] \\ \text{DGB} \left[ \text{MAX-QUD} \left[ \begin{array}{l} \text{PARAMS } \{ \} \\ \text{PROP } \left[ \begin{array}{l} \text{QUANTS } \langle \text{not-rel} \rangle \\ \text{NUCL } \boxed{1} [\text{gentle}(i)] \end{array} \right] \end{array} \right] \right] \end{array} \right]$$

Figure 1: Semantic content of *yes* and *no*

As illustrated in Figure 1, the particle *yes* response to the question affirms not the negative proposition

but just the truth value of the nucleus meaning [*gentle(i)*]. Meanwhile, *no* in (20) disaffirms the nucleus meaning of [*gentle(i)*], eventually gives us the propositional meaning such that he is not gentle.

#### 4.3 Answering a negative question in the truth-based system

The head-final language Korean also uses answering particles like *ung* ‘yes’ and *ani* ‘no’ as a response to the polar question. As we have seen, a key difference from English arises from answers to a negative question:

- (24) A: i mwuncey elyep-ci anh-ci?  
 this problem difficult-CONN not-QUE?  
 ‘Isn’t this problem difficult?’
- B: Ung. ‘yes’ (=It is not difficult.)
- B’: Ani. ‘no’ (=It is difficult.)

Different from English, the affirmative particle *ung* ‘yes’ confirms the negative proposition, not the positive proposition. That is, in the Korean system the answer to a negative question confirms or disconfirms the truth of the negative proposition, one key property of the truth-based system.

The key claim of our proposal is that in the truth-based system, answering particles refer to the propositional meaning including the QUANT information while in the polarity-based system, answering particles refer to the nucleus meaning (equal to the propositional meaning minus the quantification information). The answering particle *ung* ‘yes’ and *ani* ‘no’ will thus have the information as given in Figure 2.

As illustrated in Figure 2, the answering particle *ung* ‘yes’ to the negative question asserts not the value of the NUCL but the value of the proposition (PROP) including the quantification value. This is why the answer particle *yes* in Korean to the negative proposition means not ‘This problem is difficult’ but affirms the proposition ‘This problem is not difficult’. Meanwhile, the answer *ani* ‘no’ means disconfirming the *not-rel* of the proposition ‘The problem is difficult’.

$$(25) \quad [\text{ASSERT } \neg[\neg(\text{difficult}(m))]]$$

This means Korean, different from English, may allow a double negation interpretation. Of course, because of a heavy processing load, such an instance

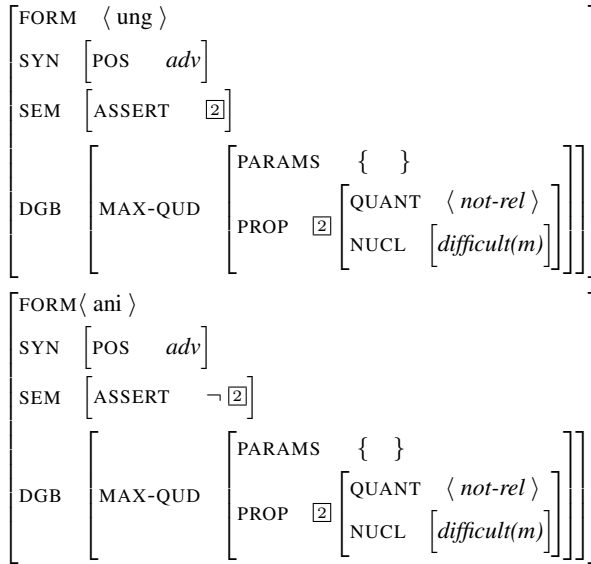


Figure 2: Semantic content of *ung* and *ani*

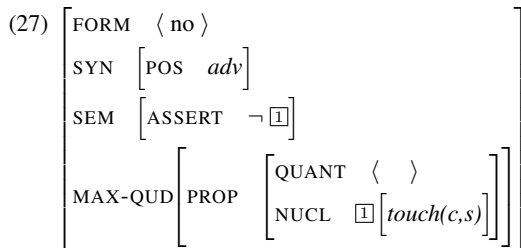
is not often used in authentic data (Roelofsen and Farkas 2015).

#### 4.4 Some consequences

The present system is discourse-based since the information recorded in the QUD plays a key role. This implies that the propositional meaning of answering particles is constructed from a polar question in the context. The analysis then would have no difficulties in picking up a proper meaning of the answering particle in exophoric cases like (26), repeated here.

- (26) (Context: A child is about to touch the socket.) Adult: No!

There is no syntactic identity condition that we can refer to here. It is not possible to identify any overt antecedent at syntax. However, in our semantic/pragmatic-based system, the negative particle can mean that the speaker does affirm the negative value of the proposition such that the child touches the socket.



As noted earlier, in languages like Korean, an echoed verb can be a reply to a polar question:

- (28) Q: ne cemsim mek-ess-ni?  
you lunch-PL eat-PST-QUE  
‘Did you have lunch?’
- A: (ung) mek-ess-e.  
yes eat-PST-DECL  
‘Yes, I had lunch.’

Holmberg (2016) suggests two different groups of the verb-echo system, one generated by the pro-drop plus VP ellipsis after the focus movement of the echoed-verb and the other by the so-called ‘big ellipsis’ which deletes a big constituent including the subject.

The first option would have a structure like the following for (28) (see Holmberg 2016: 75 for Thai)

- (29) [[<sub>IP</sub> cemsim [mek-ess-e<sub>i</sub> [<sub>VP</sub> ne-t<sub>i</sub>]]]]

The verb *mek-ess-e* ‘eat-PST-DECL’ moves and adjoins to I, and the VP is deleted under identity the VP of the question with the pro-drop of the subject *ne* ‘you’. This analysis is quite problematic for languages like Korean. For example, in Korean the echoed-verb answer is possible with the subject or object arguments being indefinite, which cannot be then pro-dropped:

- (30) Q: haksayng yelye myeong  
student several CL  
manna-ss-e?  
meet-PST-DECL  
‘Did you meet several students?’

- A: manna-ss-e ‘meet-PST-DECL’

It is prevalent that the subject of the polar question is indefinite with the echoed-verb reply.

Note that the DI approach we pursue here avoids such a problem since there is no derivational processes or invisible elements. Uttering the polar question in (27) would evoke the following MAX-QUD information:

- (31) a. λ{ }eat(y,l)
- b. [ MAX-QUD [ PROP [ QUANT ⟨ ⟩ ] ] ]  
[ NUCL [ eat(y,l) ] ] ] ] ]

As represented here, the question under discussion is whether the hearer ate lunch or not, and the answer here also represents this proposition. The response *mek-ess-e* ‘eat-PST-DECL’ confirms this proposition with the context providing the arguments for the predicate.

## 5 Conclusion

We have shown that stand-alone answer particles are just nonsentential utterances with anaphoric nature and their interpretations refer to the context in question. We have also seen that the main difference between the polarity-based and truth-based answering concerns whether the propositional anaphoric expressions refer to the propositional meaning including the negative quantification or to its nucleus meaning minus the quantification meaning. The former is the truth-based system (e.g., Korean) whereas the latter is the polarity-based system (e.g., English). Thus what matters in polarity answers is the ‘anaphoric potential’ of the polarity particle and the ‘polarity sensitivity’ of the question-under-discussion (QUD).

## Acknowledgements

For helpful comments and discussion, I thank the conference participants including Hiroya Fujisaki, David Oshima, and Rachael Roxas. I also thank Incheol Choi, Jungsoo Kim, Okgi Kim, Joanna Nykiel, and Rok Sim for helpful comments. This work was supported by Global Research Network Program through the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2017S1A2A2041092).

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