# Cantonese Question Particles 

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#### Abstract

This paper analyzes four kinds of Cantonese polar questions, HO2, ME1, AA4 and A-NOT-A questions in the framework of radical inquisitive semantics (Groenendijk \& Roelofsen 2010; Aher 2012; Sano 2015). Ho2, ME1 and A-NOT-A questions have multi-dimensional semantics. In addition to their primary speech act of questioning, HO 2 and ME1 interrogatives encode secondary assertive acts of positive and negative expectations, respectively, while A-NOT-A interrogatives conventionally encode lack of expectation, hence the neutral requirement. In contrast, AA4 interrogatives are semantically simplex question acts, thus they can be used in both biased and neutral contexts. The analysis is further supported by one force-choice experiment and one naturalness-rating experiment.


## 1. Introduction

Cantonese has a number of constructions that express a polar question as in (1) and (2). ${ }^{1}$ Examples in (1) are taken from Lam (2014b,a). All of them encode a polar question meaning, but they differ in terms of the context's bias/neutrality. (1-a), a so-called A-NOT-A question, can only be asked in a neutral context. (1-b) with a sentence-final particle HO 2 is used when the speaker is biased toward the positive answer, while (1-c) with ME1 is asked when the speaker has a bias toward the negative answer. ${ }^{2}$
a. zi3ming4 jau5 mou5 fu6ceot1 gwo3 si4gaan3 aa3?

Jimmy have not.have devote ASP time PRT
'Has Jimmy spent time (on the project), or not?'
(A-NOT-A Q)
b. zi3ming4 jau5 fu6ceot 1 gwo3 si4gaan3 gaa3 ho2?

Jimmy have devote ASP time PRT HO2
'Jimmy has spent time (on the project), hasn't he?'
( HO 2 Q )
c. zi3ming4 jau5 fu6ceot1 gwo3 si4gaan3 me1?

Jimmy have devote ASP time ME
'Jimmy hasn't spent time (on the project), has he?'
(ME1 Q)
In contrast, an AA4 question like (2), which is simply marked with a final question particle AA4 is not as restricted. It can be used in both neutral and biased contexts. ${ }^{3}$
(2) zi3ming4 jau5 fu6ceot1 gwo3 si4gaan3 aa4?

Jimmy have devote ASP time AA4
'Has Jimmy spent time (on the project)?'
(AA4 Q)
The goal of this paper is to provide a semantic analysis that derives each interpretation. Lam (2014a) argues that HO2 and ME1 questions are complex speech acts of questioning and

[^0]asserting, while A-NOT-A questions are simple acts of questioning. Lam's (2014a) account of A-NOT-A questions fails to explain why they are more restricted than AA4 questions, which can be used in both biased and neutral contexts. Incidentally, Yuan \& Hara (2013); Yuan (2015) claim that Mandarin A-NOT-A questions are also complex speech acts of questioning and asserting, where the content of the assertion is a tautology, ' $p$ or not $p$ '. Yuan \& Hara (2013) argue that the assertion of ' $p$ or not $p$ ' in effect indicates the ignorance of the speaker, hence the neutrality requirement. However, Yuan and Hara's analysis also poses a conceptual problem because in truth-conditional semantics, an assertion of ' $p$ or not $p$ ' is equivalent to that of ' $q$ or not $q$ '. This paper thus offers a solution to this problem in the framework of inquisitive semantics (Groenendijk \& Roelofsen 2009). Contra Lam (2014a), the semantics of an A-NOT-A question is also multi-dimensional in that it has a question meaning as well as a secondary assertion meaning which indicates lack of 'anticipation of prior expectation-rejection shift'. The paper also reports one force-choice experiment and one naturalness-rating experiment which jointly support the proposal.

## 2. Lam (2014) on (non-)biased questions

Lam (2014a) analyzes the three interrogative constructions in (1) and proposes that an A-NOT-A question denote a simple speech act of questioning while ME1 and HO2 questions are complex speech acts of questioning and asserting.

Lam (2014a) provides convincing pieces of evidence supporting that A-NOT-A questions are neutral, HO2 questions have positive bias, and ME1 questions have negative bias.

First, only A-NOT-A questions can be used in neutral contexts as in (3). Examples (3)-(6) are adapted from Lam (2014a).
(3) Scenario: Jimmy is asked to take a seat in an interrogation room of a police station. A police officer asked for Jimmy's name and then says this.
a. nei5 hai6 m 4 hai 6 mei5gwok3 jan4?
'Are you American?'
(A-NOT-A)
b. \#nei5 hai6 mei5gwok3 jan4 ho2?
'You are American, right?'
c. \#nei5 hai6 mei5gwok3 jan4 me1?
'You aren't American, are you?'
Second, A-NOT-A questions cannot be responded by 'You are right' (Asher \& Reese 2005).
A: gam1 go3 ji6jyut6 jau5 mou5 jaa6gau2 hou6?
'Is there a 29th this February?'
(A-NOT-A)
B: \#nei5 aam1, nei5 aam1. jau5/mou5
2SG right, 2 SG right not.have/have
'You are right, you are right. There is(n't).'
In contrast, to a HO2 question, the responder B can say 'You are right' to agree with the positive answer.
(5) A: gam1 go3 ji6jyut jau5 jaa6gau2 hou6 ho2?
'There is a 29th this February, isn't there?'
B: nei5 aam1, nei5 aam1. $\checkmark$ jau5/*mou5
'You are right, you are right. There $\checkmark$ is/*isn't.'
Similarly, to a ME1 question, the responder B can say 'You are right' to agree with the negative answer.

A: gam1 go3 ji6jyut jau5 jaa6gau2 hou6 me1? 'There isn't a 29th this February, is there?'
B: nei5 aam1, nei5 aam1. *jau5/ $\checkmark$ mou5
'You are right, you are right. There *is/ $\sqrt{ }$ isn't.'
Based on these data, ${ }^{4}$ Lam (2014a) concludes that A-NOT-A questions are pure questions in that they are simple speech acts of questioning, thus can be used only when the context is neutral. On the other hand, HO2 questions are complex speech acts of questioning and assertion of $p$ while ME1 questions are also complex speech acts of questioning and assertion of $\neg p .{ }^{5}$ Lam's analysis is summarized in Table 1.

Table 1. Lam's analysis of Cantonese polar questions

| Syntax | Observation | Analysis |
| :--- | :--- | :--- |
| A-NOT-A | neutral | QUEST $(p)$ |
| HO2 | $p$ bias | QUEST $(p) \& \operatorname{ASSERT}(p)$ |
| ME1 | $\neg p$ bias | QUEST $(p) \& \operatorname{ASSERT}(\neg p)$ |

I agree with Lam (2014a) in that A-NOT-A questions are only used in neutral contexts, but contra Lam (2014a), I claim that A-NOT-A questions also have multi-dimensional semantics. To see this, let us compare A-NOT-A questions with another polar question, namely AA4 questions. First, AA4 questions are similar to A-NOT-A questions in that they are used in neutral contexts as in (7).
(7) a. Scenario: Jimmy is asked to take a seat in an interrogation room of a police station. A police officer asked for Jimmy's name and then says this.
b. nei5 hai6 mei5gwok3 jan4 aa4?
'Are you American?'
Also, just like A-NOT-A questions, AA4 questions cannot be responded by 'You're right', suggesting that AA4 questions are true questions without assertive contents.

A: gam1 go3 ji6jyut6 jau5 jaa6gau2 hou6 aa4?
'Is there a 29th this February?'
B: \#nei5 aam1, nei5 aam1. jau5/mou5
'You are right, you are right. There is(n't).'
However, the parallel breaks down with respect to the following situation. In (9), A first asserted 'There is a 29th this February!' ( $p$ ). Thus, when B responds, the context is biased toward $p$ (see Gunlogson 2003). In this biased context, an A-NOT-A question is odd while an AA4 question is good:
(9) A: gam1 go3 ji6jyut6 jau5 jaa6gau2 hou6 aa3!
'There is a 29th this February!'

[^1]B2: zan1 hai2? gam1 go3 ji6jyut jau5 jaa6gau2 hou6 aa4?
'Really? Is there a 29th this February?'
As summarized in Table 2, A-NOT-A questions can be used only in neutral contexts, while AA4 questions can be used in both neutral and biased contexts. In other words, an A-NOT-A question explicitly encodes its neutrality requirement in the semantics while an AA4 question simply performs a question act. Lam's (2014a) analysis fails to account for this contrast. Thus, this paper claims that A-NOT-A questions perform complex speech acts and AA4 questions perform simple question acts. The next section briefly reviews Yuan \& Hara (2013) who make a similar claim for Mandarin polar questions.

Table 2. Difference among "neutral" questions

| Syntax | Neutral | Biased |
| :--- | :--- | :--- |
| A-NOT-A | OK | \# |
| AA4 | OK | OK $(\neg p$ bias $)$ |

## 3. Yuan and Hara (2013) and Yuan (2015) on Mandarin A-not-A questions

Yuan \& Hara (2013); Yuan (2015) analyze Mandarin polar questions and argue that ma questions like (10) are simple questions while A-NOT-A questions like (11) perform questioning and asserting of ignorance at the same time. Mandarin data in this section are taken from Yuan \& Hara (2013).
(10) Lin xihuan Wu ma?

Lin like Wu Q
'Does Lin like Wu?'
(Mandarin MA Q)
(11) Lin xihuan bu xihuan Wu (ne)?

Lin like not like Wu NE
'Does Lin like or not like Wu?'
(Mandarin A-NOT-A Q)
Yuan and Hara's analysis is motivated by the following contrast. Just like Cantonese AA4 and A-NOT-A questions, MA questions can be used in both neutral and biased contexts, while A-NOT-A questions cannot be used in biased contexts:
(12) A: Lin xihuan Wu .

Lin like Wu
'Lin likes Wu.'
B: $\quad \checkmark$ Lin xihuan Wu ma?
\#Lin xihuan bu xihuan Wu (ne)?
(A-NOT-A Q)
According to Yuan \& Hara (2014); Yuan (2015), the Mandarin morpheme MA is a question operator. It takes a proposition $p$ denoted by its sister TP and yield a context change potential (CCP; Heim (1982)), which adds a Hamblin (1958) set $\{p, \neg p\}$ created out of the proposition $p$ onto the question under discussion (QUD) stack (Roberts 1996). ${ }^{6}$

[^2]\[

$$
\begin{equation*}
\llbracket \mathrm{MA} \rrbracket=\lambda p \cdot \lambda \mathrm{C} \cdot[\mathrm{QUD}(\mathrm{C})+\{p, \neg p\}] \tag{13}
\end{equation*}
$$

\]

Turning to Mandarin A-NOT-A questions Yuan \& Hara (2013) follow Huang (1991) and propose that the surface structure of (11) is derived from a deep structure depicted in (14).


The reduplication feature R defined in (15) creates a Hamblin set; thus, the TP denotes a set of propositions as in (16).

$$
\begin{align*}
& \llbracket \mathrm{R} \rrbracket=\lambda P \cdot \lambda x \cdot\{P(x), \neg P(x)\}  \tag{15}\\
& \llbracket \mathrm{TP} \rrbracket=\llbracket \mathrm{R}\left(\text { like.Wu)(Lin) } \rrbracket=\{\mathrm{p}, \neg \mathrm{p}\} \quad \mathrm{p}={ }^{\prime}\right. \text { Lin likes Wu' } \tag{16}
\end{align*}
$$

The particle NE is another question operator which yield a multi-dimensional meaning as indicated by ' $x$ ' in (17). On the one hand, it produces a question CCP, which adds the set of propositions $S$ to the QUD stack. On the other hand, it outputs a single proposition by connecting each proposition in $S$ with the disjunction ' $V$ ':

$$
\begin{align*}
& \llbracket \mathrm{NE} \rrbracket=\lambda S . \lambda \mathrm{c} .[\mathrm{QUD}(\mathrm{C})+S] \times \lambda S .\left(r_{1} \vee r_{2} \vee \ldots \vee r_{|S|}\right),  \tag{17}\\
& r_{i} \in S \text { for all } 1<i \leqslant|S|
\end{align*}
$$

Furthermore, Yuan \& Hara (2013) show that A-NOT-A questions obligatorily end with the low boundary tone 'L\%'. Adopting Bartels' (1997) analysis of English intonation, Yuan \& Hara (2013) propose that the L\% tone in a Mandarin A-NOT-A question is an intonational morpheme which is paratactically associated with the syntactic structure like (14). Semantically, it denotes an assertion, i.e., a CCP which adds a proposition to the Stalnakerian (1978) common ground (CG): ${ }^{7}$

$$
\begin{equation*}
\llbracket \mathrm{L} \% \rrbracket=\lambda p \cdot \operatorname{ASSERT}(p)=\lambda p \cdot \lambda \mathrm{C} \cdot[\mathrm{CG}(\mathrm{C})+p] \tag{18}
\end{equation*}
$$

This morpheme is looking for a proposition as its argument. Now, among the two meanings generated by the structure in (14), the primary meaning is already a CCP of questioning; thus the morpheme $L \%$ can only attach to the secondary meaning, i.e., the disjunction $p \vee \neg p$. As a result, the whole A-NOT-A construction with the $\mathrm{L} \%$ tone expresses a complex speech act, questioning and asserting. Yuan \& Hara (2013) claim that this assertion of $p \vee \neg p$ is the source of the neutrality requirement of A-NOT-A questions. $p \vee \neg p$ is a tautology, thus asserting $p \vee \neg p$ is an uninformative act. Following Gricean principles, the questioner is indicating his or her ignorance towards the issue $p \vee \neg p$. When the context is biased, the speaker cannot be ignorant about the issue $p \vee \neg p$; thus an A-NOT-A question cannot be use in a biased context.

[^3]In short, a mA question is a simple act of questioning while an A-NOT-A question is a complex act of questioning and asserting, as summarized in Table 3. The neutrality meaning is reinforced by the assertion component of the A-NOT-A question. The same explanation could be given to the contrast of Cantonese AA4 and A-nOT-A questions in (9). However, Yuan and Hara's implementation of the neutrality requirement faces a conceptual problem for both Mandarin and Cantonese. That is, in truth-conditional semantics, $p \vee \neg p$ is equivalent to $q \vee \neg q$ since they are both tautologies thus always true. Similarly, $\operatorname{ASSERT}(p \vee \neg p)$ is equivalent to $\operatorname{ASSERT}(q \vee \neg q)$, hence it cannot indicate the ignorance toward a particular issue $p \vee \neg p$. In order to solve this problem, this paper adopts another semantic framework, that is, inquisitive semantics.

Table 3. Yuan and Hara's analysis of Mandarin polar questions

| Syntax | Observation | Analysis |
| :--- | :--- | :--- |
| A-NOT-A | anti-bias | $\operatorname{QUEST}(p) \& \operatorname{ASSERT}(p \vee \neg p)$ |
| MA | neutral | $\operatorname{QUEST}(p)$ |

## 4. Proposal: Inquisitive Semantics

In classical truth-conditional semantics, the meaning of a sentence is determined by its truthcondition:
(19) Truth-condition: One knows the meaning of a sentence $\Leftrightarrow$ one knows under which circumstances the sentence is true and under which it is false.
(Groenendijk \& Roelofsen 2013:2)
In recent work by Groenendijk and his colleagues (Groenendijk \& Roelofsen 2009; Ciardelli et al. 2013; Ciardelli 2009; Ciardelli \& Roelofsen 2011:among others), ${ }^{8}$ it is argued that the truth-conditional semantics is not capable of analyzing interrogative sentences. In order to analyze both declarative and interrogative sentences, the new framework, inquisitive semantics, centers around support-conditions:
(20) Support-condition: One knows the meaning of a sentence $\Leftrightarrow$ one knows which information states support the given sentence, and which don't.
(Groenendijk \& Roelofsen 2013:2)
Let us see the difference between the two frameworks with figures. Each figure represents an information state $\sigma$ which contains only four possible worlds. In world 11, for instance, both $p$ and $q$ are true, in world $01, p$ is false but $q$ is true, and so on. In truth-conditional semantics, both $p \vee \neg p$ and $q \vee \neg q$ are true in all four worlds. Thus, $p \vee \neg p$ and $q \vee \neg q$ cannot be distinguished from one another as noted above. In inquisitive, i.e., support-conditional, semantics, on the other hand, the two sentences are distinguished as follows: The information state depicted in Figure 1a supports $p \vee \neg p$, while the information state depicted in Figure 1 b supports $q \vee \neg q$.

Another important feature of inquisitive semantics is that a polar question ? $\varphi$ is defined in terms of disjunction:

Questions and support:
A question ? $\varphi=\varphi \vee \neg \varphi$ is supported in $\sigma \Leftrightarrow \sigma$ either supports $\varphi$ or supports $\neg \varphi$.

[^4]

Figure 1. Support for disjunctive sentences

### 4.1 Groendijk (2013) on Dutch biased questions

Groenendijk (2013) analyzes biased questions marked by a stressed particle toch in Dutch, which seem to have the same effect as Cantonese HO2 questions. Dutch examples in this section are taken from Groenendijk (2013).

Let us start with a declarative sentence with stressed TOCH as in (22). The sentence $p$-тосн conveys a secondary meaning which indicates the speaker's prior expectation of $\neg p:{ }^{9}$

Ad is TOCH in Amsterdam.
'Ad is in Amsterdam after all'
Secondary meaning:
The speaker expected that Ad would not be in Amsterdam.
When TOCH is used in a question, $p$-TOCH?, as in (23), it gives rise to a current expectation of $p$ 'Ad is in Amsterdam'.
(23) Ad is in Amsterdam, TOCH?
'Ad is in Amsterdam, right?'
The interpretation might be clearer with possible answers to (23). If the answer is 'yes', the prior expectation of $p$ is confirmed. 'No' answers can be given either with or without TOCH. In (24-c), тосн indicates that the prior expectation $p$ is rejected.
a. Ja, Ad is in Amsterdam.
b. Nee, Ad is niet in Amsterdam.
c. Nee, Ad is TOCH niet in Amsterdam.

As mentioned above, the interpretation of $p$-TOCH? is similar to that of a Cantonese HO2 question. The questioner is biased toward the positive answer $p$.

### 4.2 Radical Inquisitive Semantics

In analyzing TOCH sentences, Groenendijk (2013) employs a radical version of inquisitive semantics (Groenendijk \& Roelofsen 2010; Aher 2012; Sano 2015). In radical inquisitive semantics, the semantics of sentences are characterized by positive and negative semantic relations between sentences and information states, support and reject: ${ }^{10}$

[^5]The atomic clause: $(|p|$ is the set of worlds where $p$ is true)
support $\sigma \vDash^{+} p$ iff $\sigma \neq \emptyset$ and $\sigma \subseteq|p|$
reject $\sigma \vDash^{-} p$ iff $\sigma \neq \emptyset$ and $\sigma \cap|p|=\emptyset$
An information state $\sigma$ is a set of possible worlds. A state $\sigma$ supports an atomic sentence $p$ just in case $\sigma$ is consistent and $p$ is true in all worlds in $\sigma$. In contrast, $\sigma$ rejects $p$ just in case $\sigma$ is consistent and $p$ is false in all worlds in $\sigma$.

As for negation, a state $\sigma$ supports $\neg \varphi$ just in case it rejects $\varphi$, and it rejects $\neg \varphi$ just in case it supports $\varphi$.
(26) The clauses for negation:
a. $\quad \sigma \vDash^{+} \neg \varphi$ iff $\sigma \vDash^{-} \varphi$
b. $\quad \sigma \vDash^{-} \neg \varphi$ iff $\sigma \vDash^{+} \varphi$

Turning to conjunction, a state $\sigma$ supports $\varphi \wedge \psi$ just in case it supports both $\varphi$ and $\psi$, and it rejects $\varphi \wedge \psi$ just in case it rejects either $\varphi$ or $\psi$.

The clauses for conjunction:
a. $\quad \sigma \vDash^{+} \varphi \wedge \psi$ iff $\sigma \vDash^{+} \varphi$ and $\sigma \vDash^{+} \psi$
b. $\quad \sigma \vDash^{-} \varphi \wedge \psi$ iff $\sigma \vDash^{-} \varphi$ or $\sigma \vDash^{-} \psi$

Similarly, a state $\sigma$ supports $\varphi \vee \psi$ just in case it supports either $\varphi$ or $\psi$, and it rejects $\varphi \vee \psi$ just in case it rejects both $\varphi$ and $\psi$.
(28) The clauses for disjunction:
a. $\quad \sigma \vDash^{+} \varphi \vee \psi$ iff $\sigma \vDash^{+} \varphi$ or $\sigma \vDash^{+} \psi$
b. $\quad \sigma \vDash^{-} \varphi \vee \psi$ iff $\sigma \vDash^{-} \varphi$ and $\sigma \vDash^{-} \psi$

In order to analyze тосн, Groenendijk (2013) introduces a basic sentential operator, ( $\neg$ ). Thus, (29) translates as $(\neg) p$ :
(29) Ad is тоCH in Amsterdam.
'Ad is in Amsterdam after all'
Recall that an interrogative sentence is defined as $? \varphi={ }_{\operatorname{def}} \varphi \vee \neg \varphi$. Now, an interrogative operator for TOCH? is defined as:

$$
\begin{equation*}
?_{(\neg)} \varphi==_{\operatorname{def}} \varphi \vee(\neg) \neg \varphi \tag{30}
\end{equation*}
$$

Consequently, (31) translates as $?_{(\neg)} p=p \vee(\neg) \neg p$.
(31) Ad is in Amsterdam, TOCH?
'Ad is in Amsterdam, right?'
As discussed in Section 4.1, sentences with TOCH give rise to prior/current expectations. Thus, in defining semantics for TOCH sentences, Groenendijk (2013) introduces two notions, 1) the expectations in an information state $\sigma$; and 2 ) the history of $\sigma$.

[^6]First, a model includes a function $\varepsilon$ which takes any information state $\sigma$ and yield an expectation state $\varepsilon(\sigma) \subseteq \sigma$.

Second, in order to talk about different stages in the history of an information state, $\sigma$ is now changed into a sequence of states. If $\sigma$ is such a sequence, length $(\sigma)$ returns the number of stages in $\sigma$. For $n<\operatorname{length}(\sigma), \sigma_{n}$ refers to the $n$-th stage in $\sigma$ from the current stage $\sigma_{0}$. Thus, when $\sigma_{n}$ is more recent than $\sigma_{m}, m>n$.

To define the semantics of $(\neg) \varphi$, Groenendijk (2013) introduces another semantic relation, prior expectation-rejection shift. It characterizes the changes of expectations through the stages. Initially, some proposition was expected but it became no longer expected at some later stage. At the most recent stage, the proposition is rejected.

## Prior expectation-rejection shift

Let $t<$ length $(\sigma)$.
$\sigma_{t} \vDash_{\mathscr{M}}^{\bullet} \varphi$ iff $\exists t^{\prime}$ : length $(\sigma)>t^{\prime}>t$ such that:

1. $\varepsilon_{\mathscr{M}}\left(\sigma_{t^{\prime}}\right) \vDash_{\mathscr{M}}^{+} \varphi$ and
2. $\forall t^{\prime \prime}:$ if $t^{\prime}>t^{\prime \prime}>t$, then $\varepsilon_{\mathscr{M}}\left(\sigma_{t^{\prime \prime}}\right) \not \forall_{\mathscr{M}}^{+} \varphi$ and
3. $\sigma_{t+1} \vDash_{\mathscr{M}}^{-} \varphi$

Based on (32), semantics for TOCH sentences, i.e., $(\neg) \varphi$ is defined as follows:
(33) Semantics for TOCH
a. $\quad \sigma_{t} \vDash_{\mathscr{M}}^{+}(\neg) \varphi$ iff $\sigma_{t} \vDash^{+} \mathscr{M} \varphi$ and $\sigma_{t} \vDash^{\bullet} \mathscr{M} \neg \varphi$
b. $\quad \sigma_{t} \vDash_{\mathscr{M}}^{-}(\neg) \varphi$ iff $\sigma_{t} \vDash^{-} \mathscr{M} \varphi$ and $\sigma_{t} \vDash^{\mathscr{M}} \neg \varphi$

Let us see how the interpretations of (34) are derived. As its primary speech act, it asserts $p\left(\sigma_{0} \vDash_{\mathscr{M}}^{+} p\right)$. At the same time, as its secondary act, it indicates that $\neg p$ is a prior expectation, which is now rejected ( $\sigma_{0} \vDash_{\mathscr{M}}^{\bullet} \neg p$ ).

Ad is тосн in Amsterdam.

$$
\begin{equation*}
((\neg) p) \tag{34}
\end{equation*}
$$

That is, 'Ad would not be in Amsterdam' used to be expected, $\varepsilon_{\mathscr{M}}\left(\sigma_{2}\right) \vDash^{+}{ }_{\mathscr{M}} \neg p$, but at some point it stopped being expected, $\forall t^{\prime \prime}:$ if $2>t^{\prime \prime}>0, \varepsilon_{\mathscr{M}}\left(\sigma_{t^{\prime \prime}}\right) \nvdash_{\mathscr{M}}^{+} \neg p$. Finally, it is rejected, $\sigma_{1} \vDash_{\mathscr{M}}^{-} \neg p$.
 semantics is derived as follows:

Derived semantics for TOCH?
a. $\quad \sigma_{t} \vDash^{+}{ }_{\mathscr{M}}{ }_{\left({ }_{(\neg)}\right.} \varphi$ iff $\sigma_{t} \vDash_{\mathscr{M}}^{+} \varphi$, or $\left(\sigma_{t} \vDash^{+} \not{ }_{M} \neg \varphi\right.$ and $\left.\sigma_{t} \vDash^{\bullet} \mathscr{M} \varphi\right)$
b. $\quad \sigma_{t} \vDash_{\mathscr{M}}^{-}$? ${ }_{(\neg)} \varphi$ never

Thus, (36) asks $p \vee \neg p$, i.e., $\sigma_{0} \vDash_{\mathscr{M}}^{+} p$ or $\sigma_{0} \vDash_{\mathscr{M}}^{+} \neg p$, and at the same time, in case that the answer was negative, it anticipates a current expectation-rejection, $\sigma_{0} \vDash_{\mathscr{M}}^{\bullet} p$.

Ad is in Amsterdam, TOCH?

$$
\begin{equation*}
\left(?_{(\neg)} p=p \vee(\neg) \neg p\right) \tag{36}
\end{equation*}
$$

Thus, 'Ad is in Amsterdam' is currently expected, $\varepsilon_{\mathscr{M}}\left(\sigma_{2}\right) \vDash^{+}{ }_{\mathscr{M}} p$. But, there was some move in the conversation that made 'Ad is in Amsterdam' no longer expected, $\forall t^{\prime \prime}$ : if $2>t^{\prime \prime}>0$, then $\varepsilon_{\mathscr{M}}\left(\sigma_{t^{\prime \prime}}\right) \not \forall_{\mathscr{M}}^{+} p$.

If the answer to (36) is 'yes', there is no prior expectation-rejection shift. If the answer is 'no', 'Ad is in Amsterdam' is rejected, $\sigma_{1} \vDash^{-} \not \mathscr{M}$ :
a. Ja, Ad is in Amsterdam.
b. Nee, Ad is niet in Amsterdam.
c. Nee, Ad is TOCH niet in Amsterdam.

In summary, a TOCH declarative, $(\neg) p$, conventionally encodes a rejection of prior expectation $\neg p$ as a secondary assertion. A TOCH? interrogative, $?_{(\neg)} p$, secondarily asserts the anticipation of a rejection of current expectation $p$.

Recall that a Cantonese HO2 question indicates a bias toward the positive answer. Thus, it can be analyzed analogously to the Dutch тосн?.

### 4.3 Back to the Cantonese questions

Based on the data reported by Lam (2014a) and the novel data in (7)-(9) in Section 2, I propose that among the four kinds of the Cantonese questions, only an AA4 question denotes a simplex speech act of questioning, while A-NOT-A, HO2 and ME1 questions are multi-dimensional in that they perform question acts as well as secondary assertion acts.

I define the semantics of each questions which derives the correct interpretations in the framework of radical inquisitive semantics. First, let us take a HO 2 question as it is identical to the Dutch тосн? question, as in (38).

Semantics of a HO2 question
a. $\quad \sigma_{t} \vDash^{+} \mathscr{M} \operatorname{HO2}(\varphi)$ iff $\sigma_{t} \vDash_{\mathscr{M}}^{+} \varphi$, or $\left(\sigma_{t} \vDash_{\mathscr{M}}^{+} \neg \varphi\right.$ and $\left.\sigma_{t} \vDash^{\bullet} \mathscr{M} \varphi\right)$
b. $\quad \sigma_{t} \vDash^{-}-\boldsymbol{H O} 2(\varphi)$ never

Recall that HO2 questions cannot be used in neutral contexts (3-b) and the addressee can respond to a HO 2 question by saying "You're right" to agree with the positive answer (5). Both facts are correctly predicted since $\operatorname{HO2(p)}$ semantically indicates that the questioner has an expectation toward $p$.

Similarly, a ME1 question indicates that the questioner has an expectation toward $\neg p$. Thus, it cannot be used in neutral contexts (3-c) ant can be responded with "You're right" to agree with the negative answer (6).

Semantics of a ME1 question
a. $\quad \sigma_{t} \vDash^{+} \mathscr{M}^{\operatorname{ME}}(\varphi)$ iff $\sigma_{t} \vDash_{\mathscr{M}}^{+} \neg \varphi$, or $\left(\sigma_{t} \vDash^{+} \mathscr{M} \varphi\right.$ and $\left.\sigma_{t} \vDash_{\mathscr{M}}^{\bullet} \neg \varphi\right)$
b. $\quad \sigma_{t} \vDash_{\mathscr{M}}^{-} \operatorname{ME1}(\varphi)$ never

Now, let us turn to the two questions which appear to be "neutral". First, an AA4 question is defined as a simplex question as in (40).
(40) Semantics of an AA4 question
a. $\quad \sigma_{t} \vDash_{\mathscr{M}}^{+} \operatorname{AA} 4(\varphi)$ iff $\sigma_{t} \vDash_{\mathscr{M}}^{+} \varphi$ or $\sigma_{t} \vDash_{\mathscr{M}}^{+} \neg \varphi$
b. $\quad \sigma_{t} \vDash^{-}{ }_{\mathscr{M}} \mathrm{AA} 4(\varphi)$ never

Put another way, it does not encode any expectation within its semantics. Thus, it can be used in neutral contexts (7). At the same time, it can also be used in biased contexts (9), repeated here as (41).

A: gam1 go3 ji6jyut6 jau5 jaa6gau2 hou6 aa3!
'There is a 29th this February!'
B: zan1 hai2? gam1 go3 ji6jyut jau5 jaa6gau2 hou6 aa4?
'Really? Is there a 29th this February?'

In this case, the bias or expectation meaning arises as a pragmatic effect. A asserted 'There is a 29th this February' $(=p)$. If B did not have any prior expectation, B should just accept $p$. Still, B asks a question $p \vee \neg p$. Hence, B is anticipating a rejection of his/her prior expectation $\neg p$. Furthermore, since it is a simple question, it cannot be responded by 'You are right', as we have seen in (8).

Finally, I agree with Lam (2014a) in that A-NOT-A questions are neutral questions, though contra Lam (2014a), I propose that A-NOT-A questions are complex speech acts. In other words, A-nOT-A questions are anti-bias questions. They semantically negate any anticipation of prior expectation-rejection shift toward $p$ or $\neg p$.

Semantics of an A-NOT-A question
a. $\quad \sigma_{t} \vDash_{\mathscr{M}}^{+}$A-NOT-A $(\varphi)$ iff $\left(\sigma_{t} \vDash_{\mathscr{M}}^{+} \varphi\right.$ or $\left.\sigma_{t} \vDash_{\mathscr{M}}^{+} \neg \varphi\right)$ and $\sigma_{t} \nvdash^{\bullet} \mathscr{M}$ $\varphi \vee \neg \varphi$
b. $\quad \sigma_{t} \vDash_{\mathscr{M}}$ A-NOT-A $(\varphi)$ never

Therefore, A-NOT-A questions can be of course used in neutral contexts (3-a). However, they cannot be used when the speaker expresses his or her bias. Consider (43), which is a repetition of (9) followed by A's answer. As before, A asserted 'There is a 29th this February' $p$, but B still attempts to ask a question $p \vee \neg p$. This means that: 1) B had a prior expectation, $\varepsilon_{\mathscr{M}}\left(\sigma_{3}\right) \vDash_{\mathscr{M}}^{+} p ; 2$ ) A's first assertion indicates that $p$ is no longer supported by the expectation state, $\left.\varepsilon_{\mathscr{M}}\left(\sigma_{2}\right) \nvdash_{\mathscr{M}}^{+} p ; 3\right)$ A's answer indicates that $p$ is rejected, $\sigma_{1} \not \psi_{\mathscr{M}}^{-} p$. Thus, $\sigma_{1} \vDash^{\bullet} \mathscr{M} p$. This contradicts the secondary component of the semantics of A-NOT-A question, $\sigma_{1} \not^{\circ} \mathscr{M}$

A: gam1 go3 ji6jyut6 jau5 jaa6gau2 hou6 aa3!
'There is a 29th this February!'
B: \#zan1 hai2? gam1 go3 ji6jyut6 jau5 mou5 jaa6gau2 hou2?
'Really? Is there a 29th this February or not?'
(A-NOT-A)
A: jau5.
'Yes.'
Note also that the conceptual problem that Yuan \& Hara (2013) face does not arise here, since in inquisitive semantics, $p \vee \neg p$ is not a tautology. $\sigma_{t} \not \forall^{\bullet} \mathscr{M} p \vee \neg p$ is not equivalent to $\sigma_{t} \mathscr{F}_{\mathscr{M}}^{\bullet} q \vee \neg q$.

As summarized in Table 4, among the four Cantonese polar questions considered in this paper, only AA4 questions are simplex questions while HO2, ME1 and A-NOT-A questions have multi-dimensional semantics. The bias meaning that arises from an AA4 question is due to the pragmatic pressure. HO2 and ME1 questions semantically encode prior-expectations toward $p$ and $\neg p$, respectively, as their secondary speech acts. Lastly, A-nOT-A questions encode the neutrality requirement in their semantics as lack of anticipation of prior expectation-rejection shift.

Table 4. Inquisitive-semantics-based analysis of Cantonese polar questions

| Syntax | Semantics |
| :--- | :--- |
| HO2 | $\sigma_{t} \vDash_{\mathscr{M}}^{+} \varphi$, or $\left(\sigma_{t} \vDash_{\mathscr{M}}^{+} \neg \varphi\right.$ and $\left.\sigma_{t} \vDash^{\bullet} \mathscr{M} \varphi\right)$ |
| ME1 | $\sigma_{t} \vDash_{\mathscr{M}}^{-} \neg \varphi$, or $\left(\sigma_{t} \vDash_{\mathscr{M}}^{+} \varphi\right.$ and $\left.\sigma_{t} \vDash_{\mathscr{M}}^{\bullet^{\prime}} \neg \varphi\right)$ |
| AA4 | $\sigma_{t} \vDash_{\mathscr{M}}^{-+} \varphi$ or $\sigma_{t} \vDash_{\mathscr{M}}^{+} \neg \varphi$ |
| A-nOT-A | $\left(\sigma_{t} \vDash_{\mathscr{M}}^{+} \varphi\right.$ or $\left.\sigma_{t} \vDash_{\mathscr{M}}^{+} \neg \varphi\right)$ and $\sigma_{t} \Vdash_{\mathscr{M}}^{\bullet} \varphi \vee \neg \varphi$ |

### 4.4 Summary

Cantonese has a variety of (non-)biased polar questions. HO2 and ME1 questions express a bias toward the positive and negative answers, respectively. In contrast, A-NOT-A and AA4 questions seem to be neutral questions. Thus, Lam (2014a) analyzes HO2 and ME1 questions as complex speech acts of questioning and asserting while A-NOT-A questions are simple acts of questioning. Lam's (2014a) account cannot explain the contrast between A-NOT-A and AA4 questions, A-NOT-A questions can only be used in neutral contexts while AA4 questions can be used in both neutral and biased contexts. Incidentally, Yuan \& Hara (2013) claim that Mandarin A-NOT-A questions are also complex speech acts of questioning and asserting, where the content of the assertion is a tautology, ' $p$ or not $p$ '. Yuan \& Hara (2013) argue that the assertion of ' $p$ or not $p$ ' in effect indicates the ignorance of the speaker, hence the neutrality requirement. However, Yuan and Hara's analysis is also conceptually problematic. In truth-conditional semantics, an assertion of ' $p$ or not $p$ ' is equivalent to that of ' $q$ or not $q$ '. This paper thus offers a solution to this problem in the framework of inquisitive semantics (Groenendijk \& Roelofsen 2009), where meaning of sentences are given based on support-conditions. Contra Lam (2014a), the semantics of an A-NOT-A question is also multi-dimensional in that it has a primary question meaning as well as a secondary assertion meaning which indicates lack of 'anticipation of prior expectation-rejection shift'. Therefore, A-NOT-A questions are anti-bias questions, thus cannot be used when the questioner wants to express his or her bias toward one of the answers, while AA4 questions are simple questions which can be pragmatically rendered into biased questions in biased contexts.

The rest of the paper is devoted to reinforce the empirical basis of the proposal. I conducted one force-choice survey and one naturalness rating survey and elicited linguistic judgements from native speakers who are naive to the linguistic phenomenon and theory at issue.

## 5. Experiments

### 5.1 Experiment I: Force-Choice

The predictions for the distribution of question forms and context are as follows:
(44) a. In NEUTRAL contexts, A-NOT-A questions are most preferred.
b. In POSITIVE contexts, HO 2 questions are most preferred.
c. In NEGATIVE contexts, ME1 questions are most preferred.
d. AA4 questions occur in all contexts.

The aim of Experiment I is to verify these predictions.

### 5.1.1 Method

Stimuli The stimuli had two fully-crossed factors-contexts (NEUTRAL/ POSITIVE/NEGATIVE) and question forms (A-NOT-A/HO2/ME1/AA4): ${ }^{11}$
(45) Contexts:
a. Neutral: A mou5 gin3gwo3 Ben, soeng2zi1 keoi5 zung1ji3 mat1je5
'A has never met Ben before and is wondering what he likes.'
b. Positive bias: A ji5wai4 Ben zung1ji3 daa2gei1, daan6hai6 B waa6 keoi5 hai6 syu1cung4. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought Ben likes videogames but B says he is a book-worm. So A asks B to check.'

[^7]c. Negative bias: A ji5wai4 Ben hai6 syu1cung4, daan6hai6 B waa6 keoi5 zung1ji3 daa2gei1. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought Ben is a book-worm but B says he likes videogames. So A asks B to check.'
(46) Target sentences:
a. Ben zung1-m4-zung1ji3 daa2gei1?

Ben like-not-like play-videogames
'Does Ben like videogames or not?'
b. Ben zung1ji3 daa2geil aa4?

Ben like videogames PRT
'Does Ben like videogames?'
c. Ben zung1ji3 daa2gei1 aa3 ho2?

Ben like play-videogame PRT PRT
'Ben likes videogames, right?'
d. Ben zung1ji3 daa2geil me1?

Ben likes play-videogames PRT
'Ben doesn't like videogames, does he?'

There were 12 items and each item had 3 contexts, resulting in 36 questions ( 12 items * 3 contexts). 108 questions from another experiment were also included.

Procedure The experiment was conducted in a quiet meeting room at City University of Hong Kong. The stimuli were presented in Chinese characters by Qualtrics. ${ }^{12}$ The first page of the test showed the instructions.

In the main section, the participants were asked to read each context, and then select the most natural utterance among the four choices, A-NOT-A, HO2, ME1 and AA4 questions.

To avoid minimal pair sentences from appearing next to each other, the main experiment was organized into 12 blocks and ach block contained 3 questions. None of the stimuli were repeated. In order to counter-balance practice and fatigue effects, the order of the blocks and the stimuli within each block were randomized by the Qualtrics software.

Participants Ten native speakers of Cantonese participated in the rating experiment. They were undergraduate students recruited from City University of Hong Kong and received 80 Hong Kong dollars as compensation.

Statistics To analyze the results, a generalized linear mixed model (Nelder \& Wedderburn 1972) was run using the lme 4 package (Bates et al. 2015) implemented in R (R Core Team 2017). Context types and question forms were the fixed factors. Speakers and items were the random factors. The $p$-values were calculated by the summary function.

If the frequency of the question forms depends on the type of context, then the dependency is expected to result in a significant interaction between forms and contexts.

[^8]
### 5.1.2 Result \& Discussion

Figure 2 shows the frequency of each question form in the three context types.


Figure 2. Force Choice Frequencies

The first three predictions in (44) were confirmed: A-nOT-A questions were most frequent in NEUTRAL contexts (compared with POSITIVE: $z=-8.291 ; p<0.001$; with NEGATIVE: $z=$ $-9.139 ; p<0.001$ ). HO2 questions were most frequent in POSITIVE contexts (compared with NEUTRAL: $z=-5.065 ; p<0.001$; with NEGATIVE: $z=-3.674 ; p<0.001$ ). ME1 questions were most frequent in NEGATIVE contexts (compared with NEUTRAL: $z=-5.272 ; p<0.001$; with POSITIVE: $z=-6.901 ; p<0.001$ ).

In contrast, the prediction regarding the AA4 questions (44-d) was not confirmed: AA4 questions were significantly most frequent in POSITIVE contexts (compared with NEUTRAL: $z=-5.131 ; p<0.001$; with NEGATIVE: $z=-4.014 ; p<0.001$ ). This may seem puzzling given the introspection-based data discussed above. I speculate that this result comes from the format of Experiment I and the fact that HO2 questions are generally marked forms. Since in Experiment I, the participants were forced to choose the best form given a context, the AA4 question, the default form of question, was rarely chosen in NEUTRAL and NEGATIVE contexts. In POSITIVE contexts, on the other hand, although HO2 questions are most natural, the forms themselves are marked, thus a default AA4 becomes more frequent. The next section reports a naturalness rating experiment which tests these speculations.

### 5.2 Experiment 2: Naturalness rating

In Experiment II, predictions parallel to Experiment I (47) as well as (48) are tested as a naturalness rating study.
(47) a. In NEUTRAL contexts, A-NOT-A questions are most natural.
b. In POSITIVE contexts, HO 2 questions are most natural.
c. In NEGATIVE contexts, ME1 questions are most natural.
d. AA4 questions are natural in all contexts.
(48) In general, HO 2 questions are degraded.

### 5.2.1 Method

Stimuli The same contexts and sentences as Experiment I were used. Each of the 12 conditions had 12 items, resulting in 144 target sentences ( 12 items * 12 conditions). 36 questions from another experiment were also included.

Procedure In the main section, the participants were asked to read each stimulus, and then judge the naturalness of the stimuli on a 7-point scale (provided in Chinese characters): from " 7 : very natural" to " 1 : very unnatural". The experiment was organized into 12 blocks. Each block contained 12 questions. The other aspect of the procedure was the same as Experiment I.

Participants Ten native speakers of Cantonese who did not participate in Experiment I participated in the naturalness rating experiment. The other aspect of the procedure was the same as Experiment I.

Statistics The responses were recorded as numerical values: from very natural=7 to very unnatural=1. To analyze the results, a general linear mixed model (Baayen 2008; Baayen et al. 2008; Bates 2005) was run using the lmerTest package (Kuznetsova et al. 2016) implemented in R (R Core Team 2017). Question forms and context types were the fixed factors. Speakers and items were the random factors. The $p$-values were calculated by the Markov chain Monte Carlo method using the LanguageR package (Baayen 2013). If the naturalness of the question forms depends on the type of context, then the dependency is expected to result in a significant interaction between forms and contexts.

### 5.2.2 Result \& Discussion

Figure 3 shows the result of Experiment II. Just like Experiment I, the first three predictions in (47) were confirmed: A-nOT-A questions were most natural in NEUTRAL contexts (compared with positive: $t=-5.578 ; p<0.001$; with NEGATIVE: $t=-9.911 ; p<0.001$ ). Ho2 questions were most natural in POSITIVE contexts (compared with NEUTRAL: $t=-2.091 ; p<0.05$; with NEGATIVE: $t=-4.369 ; p<0.001$ ). ME1 questions were most natural in NEGATIVE contexts (compared with NEUTRAL: $t=-18.65 ; p<0.001$; with POSITIVE: $t=-21.67 ; p<$ $0.001)$.

In contrast, the prediction regarding the AA4 questions (47-d) was not straightforwardly confirmed since AA4 questions were significantly most natural in NEGATIVE contexts (compared with Neutral: $t=-3.955 ; p<0.001$; with Positive: $t=-4.423 ; p<0.001$ ). However, if we compare the ratings of AA4 questions with other forms in the same context, they have significantly higher ratings than other non-top-rated forms as can be seen in Figure 4. In NEUTRAL contexts, AA4 questions were more natural than HO2 questions ( $t=-2.180 ; p<0.05$ ) and ME1 questions ( $t=-5.843 ; p<0.001$ ). In POSITIVE contexts, AA4 questions were more natural than ME1 questions $(t=-7.100 ; p<0.001)$. In NEGATIVE contexts, AA4 questions were more natural than A-NOT-A questions $(t=-4.874 ; p<0.001)$ and HO2 questions ( $t=$ $-8.686 ; p<0.001$ ).

Finally, question form types show a significant main effect. In particular, HO2 questions were least preferred (mean: 3.369444) among the four question types (compared with A-NOT-A (mean: 4.669444): $t=8.794 p<0.001$; compared with ME1 (mean: 3.630556): $t=1.766 ; p<$ 0.1 ; compared with AA4 (mean: 4.069444 ): $t=4.735 ; p<0.001$ ), supporting the prediction (48).

In addition, AA4 questions are preferred over HO2 ( $t=-4.735 ; p<0.001$ ) and ME1 $(t=$ $-2.969 ; p<0.01$ ) questions, which is compatible with the prediction (47-d).


Figure 3. Naturalness Ratings (sorted by forms)


Figure 4. Naturalness Ratings (sorted by contexts)


Figure 5. Naturalness Ratings (main effect of forms)

Finally, one of the unexpected results is that as can be seen in Figures 4 and 5, A-NOT-A is significantly more preferred than AA4 both in positive contexts $(t=4.062 ; p<0.001)$ and in general ( $t=4.059 ; p<0.001$ ). Given the discussion in Section 4, this is unexpected since A-NOT-A questions encodes neutrality semantics in their semantics thus they should be more restricted than AA4.

### 5.3 General Discussion

The results of the two experiments support the current proposal summarized in Table 4. First, A-NOT-A, HO2, and ME1 questions are most frequent and most natural in NEUTRAL, POSITIVE and Negative contexts, respectively. Second, aA4 questions can be used in all three contexts. The result of Experiment II show that HO2 questions are in general degraded, which explains why HO 2 questions were not significantly more frequent than AA4 questions in Experiment I. One puzzling result is that A-NOT-A questions were more natural than AA4 questions both in positive contexts and in general. In fact, this result is not incompatible with the current proposal. As discussed by Lam (2014a) and in Section 4, the positive bias of a HO2 question arises from the assertion of the prejacent while an A-NOT-A question does not involve such an assertion. This difference explains why the addressee can reply to the HO2 question by saying 'You're right' but not to the A-NOT-A. Now, in the POSITIVE contexts of the experiment stimuli like (45), I speculate that it is possible that the questioner only had a private belief toward the positive answer and he or she can pretend to be neutral to ask an A-NOT-A question without expressing his or her positive bias. It will be an important future step to constructs the stimuli so that the contexts clearly differ in the questioner only has a private belief or explicitly expresses his or her bias.

## 6. Conclusion

### 6.1 Summary

This paper investigated four kinds of Cantonese polar questions, HO2, ME1, AA4 and A-NOT-A questions in the framework of radical inquisitive semantics (Groenendijk \& Roelofsen 2010; Aher 2012; Sano 2015). HO2, ME1 and A-NOT-A questions have multi-dimensional semantics. In addition to their primary speech act of questioning, HO2 and ME1 interrogatives encode secondary assertive acts of positive and negative expectations, respectively, while A-NOT-A interrogatives conventionally encode lack of expectation, hence the neutral requirement. In contrast, AA4 interrogatives are semantically simplex question acts, thus they can be used in both biased and neutral contexts. The analysis is further supported by one force-choice experiment and one naturalness-rating experiment. The results mostly confirmed the current proposal's predictions: A-NOT-A, HO2, and ME1 questions are most frequent and most natural in NEUTRAL, POSITIVE and NEGATIVE contexts, respectively. Also, AA4 questions can be uttered in all three contexts.

### 6.2 Future directions

The experiments also brought up new issues. First, HO2 questions seem to be less preferred in general. This might be due to the fact that the particle ho2 usually embeds another particle like $a a 3$ as can be see in the stimuli in the appendix. As mentioned in footnote (6), ? treats $h o 2$ as a speech act modifier. It is possible that this complexity in the left periphery requires a pragmatically rich context to make the HO2 question more natural. Second, we need to tease apart the questioner's private belief toward one answer and his or her expression of the bias. Presumably, A-NOT-A questions can be uttered in positive contexts since the questioner can merely hold a private belief, while HO 2 and ME1 questions explicitly assert his or her bias toward one of the answers.

Another important outstanding issue is the compositionality of the interpretations of these questions. In the current paper, semantics of each interrogative is stipulated at the level of the entire construction. Although Yuan and Hara's analysis of A-NOT-A questions has the conceptual problem in deriving the neutrality requirement, it has the nice compositional picture which derives the meaning from the syntactic structure and paratactic association of the $\mathrm{L} \%$ tone with the construction. It appears to be fruitful to test whether a similar morphological analysis can be given to the Cantonese A-NOT-A construction.

Finally, as mentioned in Footnote 10, radical inquisitive semantics is now evolved into suppositional inquisitive semantics which can handle conditional sentences. It would be interesting to see whether the new framework has any implication for the Cantonese conditional questions.

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## A. Stimuli

(1) a. Neutral: A seng4jat6 tung4 Jenny sik6 tim4ban2, gin3keoi5 ci3ci3-dou1 m 4 sik4 san1dei2, soeng2 zi1 keoi5 hai6 mai6 deoi3 faa1sang1 man5gam2.
'A always has dessert with Jenny and found her never eats sundae. A is wondering if she is allergic to peanuts.'
b. Positive bias: A ji5wai4 Jenny deoi3 faa1sang1 man5gam2, daan6hai6 B waa6 keoi5 hai6 deoi3 laai5 man5gam2. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought Jenny is allergic to milk but B says she is allergic to peanuts. So A asks B to check.'
c. Negative bias: A ji5wai4 Jenny deoi3 laai5 man5gam2, daan6hai6 B waa6 keoi5 hai6 deoi3 faa1sang1 man5gam2. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought Jenny is allergic to peanuts, but B says she is allergic to milk. So A asks B to check.'
a. Jenny hai6-m4-hai6 deoi3 faa1sang1 man5gam2? Jenny is-not-is to peanuts allergy 'Is Jenny allergic to peanuts or not?'
b. Jenny hai6 deoi3 faa1sang 1 man5gam 2 aa4? Jenny is to peanuts allergy PRT 'Is Jenny allergic to peanuts?'
c. Jenny hai6 deoi3 faa1sang1 man5gam2 aa3 ho2? Jenny is to peanuts allergy PRT PRT 'Jenny is allergic to peanuts, right?'
d. Jenny hai6 deoi3 faa1sang 1 man5gam 2 me1? Jenny is to peanuts allergy PRT 'Jenny isn't allergic to peanuts, does she?'
a. Neutral: A m4-sik1 hon4gwok3 di1 je5, soeng2zi1 hon5gwok3jan4 sai1-m4-sai1 dong1bing1.
'A knows nothing about Korea, he wonders whether they have mandatory military service.'
b. Positive bias: A waa6 hon4gwok3 jan4 jiu3 dong1bing1, daan6hai6 B waa6 m 4 sai2. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought Korean have to serve military service but B says they don't have to. So A asks B to check.'
c. Negative bias: A waa6 hon4gwok3 jan4 m4-sai dong1bing1, daan6hai6 B waa6 jiu3. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought Korean do not have to serve military service but B says they have to. So A asks B to check.'
a. hon4gwok3 jan4 jiu3-m4-jiu3 dong1bing1?

Korea people need-not-need serve-military-service
'Do Korean need to serve military service or not?'
b. hon4gwok3 jan4 jiu3 dong1bing1 aa4?

Korea people need serve-military-service PRT
'Do Korean need to serve military service?'
c. hon4gwok3 jan4 jiu3 dong1bing1 aa3 ho2?

Korea people need serve-military-service PRT PRT
'Korean need to serve military service, right?'
d. hon4gwok3 jan4 jiu3 dong1bing1 me1?

Korea people need serve-military-service PRT
'Korean do not need to serve military service, do they?'
a. Neutral: A mou5 gin3gwo3 CityU ge3 haau6fai1, soeng2zi1 dou3 hai6 mat1je5 sik1.
'A has never seen the logo of CityU before and is wondering what colour it is.'
b. Positive bias: A ji5wai4 CityU ge3 haau6fai1 hai6 laam4-sik1 tung4 luk6-sik1, daan6hai6 B waa6 keoi5 hai6 hung4 sik1 ge3. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought the logo of CityU is blue and green, but B says it's red. So A asks B to
check.'
c. Negative bias: A ji5wai4 CityU ge3 haau6fai1 hai6 hung4 sik1, daan6hai6 B waa6 keoi5 hai6 laam4-sik1 tung4 luk6-sik1 ge3. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought the logo of CityU is red, but B says it's blue and green. So A asks B to check.'
a. Si1ti2(CITY) ge3 haau6fai1 hai6-m4-hai6 laam4-sik1 tung4 luk6-sik1?

City(U) GEN logo is-not-is blue and green 'Is the logo of CityU blue and green or not?'
b. Si1ti2(CITY) ge3 haau6fail hai6 laam4-sik1 tung4 luk6-sik1 aa4?

City(U) GEN logo is blue and green PRT 'Is the logo of CityU blue and green?'
c. Si1ti2(CITY) ge3 haau6fai1 hai6 laam4-sik1 tung4 luk6-sik1 aa3 ho2? City(U) GEN logo is blue and green PRT PRT 'The logo of CityU is blue and green, right?'
d. Si1ti2(CITY) ge3 haau6fai1 hai6 laam4-sik1 tung4 luk6-sik1 me1? City(U) GEN logo is blue and green PRT 'The logo of CityU isn't blue and green, is it?'
a. Neutral: A jiu3 heoi3 EMAX tai2 jin2coeng3wui2, daan6hai6 m 4 zi1 EMAX hai2 bin1
'A is going to a concert in EMAX, but she doesn't know where is EMAX.'
b. Positive bias: A ji5wai4 EMAX hai6 hai2 gau2lung4waan1, daan6hai6 bi(B) waa6 hai6 hai2 gau2lung4tong4. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought EMAX is at Kowloon Bay but B says it is at Kowloon Tong. So A asks B to check.'
c. Negative bias: A ji5wai4 EMAX hai6 hai2 gau2lung4tong4, daan6hai6 bi(B) waa6 hai6 hai2 gau2lung4waan1. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought EMAX is at Kowloon Tong but B says it is at Kowloon Bay. So A asks B to check.'
a. EMAX hai6-m4-hai6 hai2 gau2lung4waan1?

EMAX is-not-is at Kowloon-Bay
'Is EMAX at Kowloon Bay or not?'
b. EMAX hai6 hai2 gau2lung4waan1 aa4?

EMAX is at Kowloon-Bay PRT?
'Is EMAX at Kowllon Bay?'
c. EMAX hai6 hai2 gau2lung4waan1 aa3 ho2?

EMAX is at Kowloon-Bay PRT PRT
'EMAX is at Kowloon Bay, right?'
d. EMAX hai6 hai2 gau2lung4waan1 me1?

EMAX is at Kowloon-Bay PRT
'EMAX is not at Kowloon Bay, is it?'
a. Neutral: A mou5 heoi3gwo3 jat6bun2, soeng2zi1 jat6bun2 ho2-m4-ho2 ji5 zoek3 haai4 jap6 uk1.
'A has never been to Japan before, and is wondering they can wear shoes when visiting one's home or not.'
b. Positive bias: A ji5wai4 ho2ji5 zoek3 haai4 jap6 uk 1, daan6hai6 B waa6 m4 ho2ji5. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought they can wear shoes when visiting one's home but B says they cannot. So A asks B to check.'
c. Negative bias: A ji5wai4 m4 ho2ji5 zeok3 haai4 jap6 uk1, daan6hai6 B waa6 ho2ji5. so2ji5 A soeng2 hoeng3 B kok3jing6 haa5.
'A thought they cannot wear shoes when visiting one's home but B says they can. So A asks B to check.,
a. hai2 jat6bun2 ho2-m4-ho2ji5 zoek3 haai4 jap6 uk1?

In Japan can-not-can wear shoes go-in house
'Can we wear shoes when visiting one's home in Japan or not?'
b. hai2 jat6bun2 ho2ji5 zoek3 haai4 jap6 uk1 aa4?

In Japan can wear shoes go-in house PRT
'Can we wear shoes when visiting one's home in Japan?'
c. hai2 jat6bun2 ho2ji5 zoek3 haai4 jap6 uk1 aa3 ho2?

In Japan can wear shoes go-in house PRT PRT
'We can wear shoes when visiting one's home, right?'
d. hai2 jat6bun 2 ho2ji5 zoek3 haai4 jap6 uk1 me1?

In Japan can wear shoes go-in house PRT
'We cannot wear shoes when visiting one's home in Japan, can we?'
a. Neutral: A cung4loi4 mei6 gin3gwo3 Jimmy, hou2 soeng2 zi1 keoi5 bin1 dou6 lai4
'A has never met Jimmy before and is wondering where he is from.'
b. Positive bias: A ji5wai4 Jimmy hai6 mei5gwok3jan4 daan6hai6 B waa6 keoi5 hai6 gaa1naa4daai6jan4 so2ji5 A soeng2 hoeng3 B kok3jing6 haa5
'A thought Jimmy is American but B says he is Canadian. So A asks B to check.'
c. Negative bias: A ji5wai4 Jimmy hai6 gaa1naa4daai6jan4 daan6hai6 B waa6 keoi5 hai6 mei5gwok3jan4 so2ji5 A soeng2 hoeng3 B kok3jing6 haa5
'A thought Jimmy is Canadian but B says he is American. So A asks B to check.'
a. Jimmy hai6 m 4 hai6 mei5gwok3 jan4?

Jimmy is not is America person
'Is Jimmy American or not?'
b. Jimmy hai6 mei5gwok3 jan4 aa4?

Jimmy is America person PRT
'Is Jimmy American?'
c. Jimmy hai6 mei5gwok3 jan4 aa3 ho2?

Jimmy is America person PRT PRT
'Jimmy is American, right?'
d. Jimmy haai6 mei5gwok3 jan4 me1?

Jimmy is America person PRT
'Jimmy isn't American, is he?'
a. Neutral: A mou5 lau4sam1 soeng5tong4 keoi5 m4 zi1 keoi5 jiu3m4jiu3 zou6 dai6 luk6sap6jip6
'A was not paying attention in class and he did not know whether he needed to do p. 60 or not.'
b. Positive bias: A ji5wai4 keoi5 jiu3 zou6 dai6 luk6sap6jip6 daan6hai6 B teng1dou2 hai6 dai6 sap6luk6jip6 so2ji5 A soeng2 hoeng3 B kok3jing6 haa5
'A thought that he needed to do p. 60 but B heard that it was p. 16. So A asked B to check about it.
c. Negative bias: A ji5wai4 keoi5 jiu3 zou6 dai6 sap6luk6jip6 daan6hai6 B teng 1dou2 hai6 dai6 luk6sap6jip6 so2ji5 A soeng2 hoeng3 B kok3jing6 haa5
'A thought that he needed to do p. 16 but B heard that it was p. 60. So A asked B to check about it.
a. ngo5dei6 jiu3 m4 jiu3 zou6 dai6 luk6 sap6 jip6? we should not should do number six ten page 'Do we need to do p. 60 or not?'
b. ngo5dei6 jiu3 zou6 dai6 luk6 sap6 jip6 aa4?
we should do number six ten page PRT
'Do we need to do p. 60?'
c. ngo5dei6 jiu3 zou6 dai6 luk6 sap6 jip6 aa3 ho2?
we should do number six ten page PRT PRT 'We need to do p. 60, right?'
d. ngo5dei6 jiu3 zou6 dai6 luk6 sap6 jip6 me1? we should do number six ten page PRT 'We don't need to do p. 60, do we?'
a. Neutral: A tung4 B gong2gan2 keoi5dei6 ge3 pang4jau5 Michael A hou2 soeng2 zi1 keoi5 zung1m4zung1ji3 daa2 laam4kau4
' A and B are talking about their friend Michael. A is wondering whether he likes to play basketball or not.'
b. Positive bias: A ji5wai4 Michael zung1ji3 daa2 laam4kau4 daan6hai6 B waa6 keoi5 zung1ji3 tek3 zuk1kau4 so2ji5 A soeng2 hoeng3 B kok3jing6 haa5
'A thinks Michael likes to play basketball but B says he likes to play football. So A asks B to check.'
c. Negative bias: A ji5wai4 Michael zung1ji3 tek3 zuk1kau4 daan6hai6 B waa6 keoi5 gin3gwo3 Michael lo2zyu6 go3 laam4kau4 A hou2 ging 1ngaa5 zau6 man6 'A thinks Michael likes to play football but B says he saw Michael carrying a basketball. A is surprised and asked:'
a. Michael zung1 m 4 zung1ji3 daa2 laam4kau4? Michael like not like hit basketball? 'Does Michael like to play basketball or not?'
b. Michael zung 1ji3 daa2 laam4kau4 aa4? Michael like hit basketball PRT 'Does Michael like to play basketball?'
c. Michael zung1ji3 daa2 laam4kau4 aa3 ho2? Michael like hit basketball PRT PRT 'Michael likes to play basketabll, right?'
d. Michael zung1ji3 daa2 laam4kau4 me1? Michael like hit basketball PRT 'Michael doesn't like to play basketball, does he?'
a. Neutral: Kitty ge3 baa4baa1 maa4maa1 soeng2 maai5 syut3gou1 bei2 Kitty keoi5dei6 soeng2 zi1 Kitty wui5 gaan2 mat1je5 mei6
'Kitty's parents are buying her ice cream and they are wondering which flavour she would like to have.'
b. Positive bias: Kitty ge3 maa4maa1 ji5wai4 Kitty wui5 gaan2 wan6nei1laa2 mei6 daan6hai6 keoi5 ge3 baa4baa1 waa6 Kitty soeng2 jiu3 zyu1gullik1 mei6 syut3gou1 so2ji5 maa4maa1 man6 haa5 Kitty wui5 gaan2 mat1je5 mei6
'Kitty's mother thinks Kitty prefers vanilla flavoured but her father says Kitty wants chocolate flavoured ice cream. So the mother asks Kitty for confirmation.
c. Negative bias: Kitty ge3 maa4maa1 ji5wai4 Kitty m4 soeng2 jiu3 wan6nei1laa2 mei6 syut3gou1 daan6hai6 Kitty ge3 baa4baa1 gin3dou2 Kitty mong6zyu6 wan6nei1laa2 mei6 syut3gou1 maa4maa1 hou2 ging1ngaa5 zau6 man6
'Kitty's mother thinks Kitty doesn't want vanilla flavoured ice cream but her father saw Kitty staring at it. The mother is surprised and asked:'
a. Kitty soeng2 m 4 soeng2 jiu3 wan6nei1laa2 mei6?

Kitty want not want should vanilla flavour
'Does Kitty want to have vanilla flavoured ice cream or not?'
b. Kitty soeng2 jiu3 wan6neillaa2 mei6 aa4?

Kitty want should vanilla flavour PRT
'Does Kitty want to have vanilla flavoured ice cream?'
c. Kitty soeng2 jiu3 wan6neillaa2 mei6 aa3 ho2?

Kitty want should vanilla flavour PRT PRT
'Kitty wants to have vanilla flavoured ice cream, right?'
d. Kitty soeng2 jiu3 wan6nei1laa2 mei6 me1?

Kitty want should vanilla flavour PRT
'Kitty doesn't want to have vanilla flavoured ice cream, does she?'
a. Neutral: A hou2 soeng2 zi1 bin1go3 hai6 gam1 gaai3 zeoi3 leng3 zung6 jau5gei1 wui6 lo2dou2 hoeng 1gong2siu2ze2 gun3gwan1
'A is wondering who is the prettiest and would win the 2015 Miss Hong Kong Pageant.'
b. Positive bias: A gok3dak1 Louis Mak hai6 zeoi3 leng3 ge3 daan6hai6 B gok3dak1 Ada Pong sin1hai6 zeoi3 leng3 A soeng2 seoi3fuk6 B zau6 waa6
'A thinks Louis Mak is the prettiest while B thinks Ada Pong is the most beautiful one. A says to B to convince him:'
c. Negative bias: A gok3dak1 Ada Pong hai6 zeoi3 leng3 ge3 daan6hai6 B gok3dak1 Louis Mak sin1hai6 zeoi3 leng3 A soeng2 seoi3fuk6 B zau6 waa6
'A thinks Ada Pong is the prettiest while he heard B saying Louis Mak is prettier. A says to B to convince him:'
a. Louis Mak hai6 m 4 hai6 gam1 gaai3 zeoi3 leng3?

Louis Mak is not is this session most beautiful
'Is Louis Mak the prettiest in 2015 Miss Hong Kong Pageant or not?'
b. Louis Mak hai6 gam1 gaai3 zeoi3 leng3 aa4?

Louis Mak is this session most beautiful PRT
'Is Louis Mak the prettiest in 2015 Miss Hong Kong Pageant?'
c. Louis Mak hai6 gam1 gaai3 zeoi3 leng3 aa3 ho2?

Louis Mak is this session most beautiful PRT PRT
'Louis Mak is the prettiest in 2015 Miss Hong Kong Pageant, right?'
d. Louis Mak hai6 gam1 gaai3 zeoi3 leng3 me1?

Louis Mak is this session most beautiful PRT
'Louis Mak isn't the prettiest in 2015 Miss Hong Kong Pageant, is she?'
a. Neutral: A tung4 B joek3zo2 gam1maan5 heoi3 sik6faan6 A m4 zi1 sik6 mat1je5 hou2
'A and B are having dinner tonight. A has no idea about what kind of food they are going to have.'
b. Positive bias: A lam2zyu6 keoi5dei6 gam1maan5 sik6 jat6bun2coi3 so2ji5 keoi5 man6 haa5 B hai6 m4 hai6
'A thinks they are going to have Japanese dishes tonight so she asks B for confirmation.'
c. Negative bias: A lam2zyu6 keoi5dei6 sik6 ji3daai6lei6coi3 daan6hai6 keoi5 teng 1dou2 B hai2 jat6bun2 caan1teng1 buk1zo2 toi2 A hou2 ging1ngaa5 zau6 man6 'A thinks they are going to have Italian dishes but she heard $B$ has reserved a table at Japanese restaurant. A is surprised and asked:'
a. ngo5dei6 heoi3 m 4 heoi 3 sik6 jat6bun2 coi3?
we go not go eat Japanese vegetables 'Are we going to have Japanese cuisine or not?'
b. ngo5dei6 heoi3 sik6 jat6bun2 coi3 aa4?
we go eat Japanese vegatables PRT
'Are we going to have Japanese cuisine?'
c. ngo5dei6 heoi3 sik6 jat6bun 2 coi3 aa3 ho2?
we go eat Japanese vegetables PRT PRT
'We are going to have Japanese cuisine, right?'
d. ngo5dei6 heoi3 sik6 jat6bun2 coi3 me1?
we go eat Japanese vegetables PRT
'We aren't going to have Japanese cuisine, are we?'

## References

Aher, Martin. 2012. Free choice in deontic inquisitive semantics. In M. Aloni, V. Kimmelmann, F. Roelofsen, G.W. Sassoon, K. Schulz \& M. Westera (eds.), Logic, language and meaning, 18th amsterdam colloquium, amsterdam, 22-31. Lecture Notes in Computer Science.
Asher, Nicholas \& Brian Reese. 2005. Negative bias in polar questions. In E. Maier, C. Bary \& J. Huitink (eds.), Proceedings of SuB9,, 30-43.

Baayen, Harald R. 2008. Analyzing linguistic data: A practical introduction to statistics using $R$. Cambridge: Cambridge University Press.
Baayen, Harald R., Doug.J. Davidson \& Douglas. M. Bates. 2008. Mixed-effects modeling with crossed random effects for subjects and items. Journal of Memory and Language 59. 390-412.
Baayen, R. H. 2013. languager: Data sets and functions with "analyzing linguistic data: A practical introduction to statistics". http://CRAN.R-project.org/package= languageR. R package version 1.4.1.
Bartels, Christine. 1997. Towards a compositional interpretation of English statement and question intonation: University of Massachusetts dissertation.
Bates, Douglas. 2005. Fitting linear mixed models in R. R News 5. 27-30.
Bates, Douglas, Martin Mächler, Ben Bolker \& Steve Walker. 2015. Fitting linear mixed-effects models using lme4. Journal of Statistical Software 67(1). 1-48. doi:10.18637/jss.v067.i01.
Ciardelli, Ivano. 2009. Inquisitive semantics and intermediate logics. University of Amsterdam MA thesis. Master Thesis.
Ciardelli, Ivano, Jeroen Groenendijk \& Floris Roelofsen. 2013. Inquisitive semantics: a new notion of meaning. Language and Linguistics Compass 7(9). 459-476.
Ciardelli, Ivano \& Floris Roelofsen. 2011. Inquisitive logic. Journal of Philosophical Logic .
Groenendijk, Jeroen. 2013. тосн and тосн? in dutch. Presented at the Questions in Discourse Workshop, December 2013, Amsterdam.
Groenendijk, Jeroen \& Floris Roelofsen. 2009. Inquisitive semantics and pragmatics. Presented
at the Workshop on Language, Communication, and Rational Agency at Stanford, May 2009.
Groenendijk, Jeroen \& Floris Roelofsen. 2010. Radical inquisitive semantics. ILLC/Department of Philosophy University of Amsterdam.
Groenendijk, Jeroen \& Floris Roelofsen. 2013. Suppositional inquisitive semantics. Workshop on Inquisitive Logic and Dependence Logic, ILLC, Amsterdam, June 17, 2013.
Gunlogson, Christine. 2003. True to form: Rising and falling declaratives as questions in English. New York: Routledge.
Hamblin, C.L. 1958. Questions. Australasian Journal of Philosophy 36. 159-168.
Heim, Irene. 1982. The semantics of definite and indefinite noun phrases: University of Massachussets, Amherst dissertation. [Distributed by GLSA].
Huang, C.-T. James. 1991. Modularity and Chinese A-not-A questions. In Carol Georgopolous \& Robert Ishihara (eds.), Interdisciplinary approaches to language, 305-22. Dordrecht: Kluwer.
Kuznetsova, Alexandra, Per Bruun Brockhoff \& Rune Haubo Bojesen Christensen. 2016. lmertest: Tests in linear mixed effects models. https://CRAN.R-project.org/ package=lmerTest. R package version 2.0-33.
Lam, Zoe Wai-Man. 2014a. A complex ForceP for speaker- and addressee-oriented discourse particles in Cantonese. Studies in Chinese Linguistics 35(2). 61-80.
Lam, Zoe Wai-Man. 2014b. A unified account for biased and non-biased questions in Cantonese. Slides presented at Workshop on Innovations in Cantonese Linguistics 2 at University of Chicago, March 72014.
Law, Jess, Haoze Li \& Diti BHADRA. To appear. Questioning speech acts. In Proceedings of sinn und bedeutung 22,
Matthews, Stephen \& Virginia Yip. 1994. Cantonese: a comprehensive grammar. Routledge.
Nelder, John \& Robert Wedderburn. 1972. Generalized linear models. Journal of the Royal Statistical Society. Series A (General) (Blackwell Publishing) 135(3). 370-384.
Potts, Christopher. 2005. The logic of conventional implicatures Oxford Studies in Theoretical Linguistics. Oxford: Oxford University Press. [Revised 2003 UC Santa Cruz PhD thesis].
R Core Team. 2017. R: A language and environment for statistical computing. R Foundation for Statistical Computing Vienna, Austria. https://www.R-project.org/.
Roberts, Craige. 1996. Information structure: Towards an integrated formal theory of pragmatics. In Jae Hak Yoon \& Andreas Kathol (eds.), Osu working papers in linguistics, vol. 49, 91-136. Columbus, OH: The Ohio State University Department of Linguistics. Revised 1998.
Sano, Katsuhiko. 2015. Avoiding impossibility theorems in radical inquisitive semantics. In Ju S., Liu H. \& Ono H. (eds.), Modality, semantics and interpretations, Berlin Heidelberg: Springer.
Stalnaker, Robert. 1978. Assertion. Syntax and Semantics 9. 315-332.
Yuan, Mengxi. 2015. Mandarin discourse adverbs as presupposition triggers: City University of Hong Kong dissertation.
Yuan, Mengxi \& Yurie Hara. 2013. Questioning and asserting at the same time: the $\mathrm{L} \%$ tone in A-not-A questions. In Maria Aloni, Michael Franke \& Floris Roelofsen (eds.), Proceedings of the 19th amsterdam colloquium, 265-272.
Yuan, Mengxi \& Yurie Hara. 2014. The semantics of the two kinds of questions in Mandarin: a case study of discourse adverbs. In Jyoti Iyer \& Leland Kusmer (eds.), Proceedings of the 44th meeting of the north east linguistic society (nels44), vol. 2, 279-290. GLSA Amherst.


[^0]:    ${ }^{1}$ I assume with Matthews \& Yip (1994) that (1) and (2) are all syntactically interrogatives. That is, A-NOT-A question is an interrogative construction which is analogous to English Subject-Aux inversion, while HO2, ME1 and AA4 are question particles analogous to the Japanese question particle $k a$.
    2 The numbers in Cantonese example sentences indicate lexical tones: $1=$ high-level; $2=$ medium rising; $3=$ medium level; $4=$ low falling; $5=$ low rising; $6=$ low level.
    ${ }^{3}$ There is also maA3 particle, which is borrowed from Mandarin and somehow more formal (Matthews \& Yip 1994).

[^1]:    4 See Lam (2014a) for other arguments.
    5 See also Law et al. (To appear) who analyze HO2 as a speech act modifier. According to Law et al. (To appear), HO 2 yields a high level question act which inquires whether the embedded speech act can be felicitously performed by the addressee. The positive bias of a HO 2 utterance is explained by the felicity condition of the embedded assertion act.

[^2]:    6 ' + ' is an update function. $\operatorname{QUD}(\mathrm{c})+S$ is a stack that is exactly like $\mathrm{QUD}(\mathrm{c})$ except that $\mathrm{QUD}(\mathrm{c})+S$ has $S$ as the topmost member of the stack.

[^3]:    ${ }^{7} \mathrm{CG}(\mathrm{c})+p$ is a context that is exactly like $\mathrm{CG}(\mathrm{C})$ except that $\mathrm{CG}(\mathrm{C})+p$ has $p$.

[^4]:    ${ }^{8}$ See https://sites.google.com/site/inquisitivesemantics/for details.

[^5]:    ${ }^{9}$ Groenendijk (2013) calls this secondary meaning "conventional implicature". The current paper does not employ this term since at least for Cantonese data, the secondary meanings which arise from biased questions do not conform the properties of conventional implicatures in the sense of Potts (2005).
    10 Actually, Groenendijk (2013) uses a more recent version called suppositional inquisitive semantics (InqS) that includes the third semantic relation, dismissing a supposition, $\sigma \vDash^{\circ} p$ iff $\sigma=\emptyset$, which characterizes a denial of the

[^6]:    antecedent of conditional sentences. For the purpose of the current paper, a (non-suppositional) radical inquisitive semantics suffices since we do not consider conditional sentences.

[^7]:    ${ }^{11}$ See Appendix A for the rest of the stimuli.

[^8]:    12 Qualtrics is a web-based system that conducts online surveys. Version 45634 of the Qualtrics Research Suite. Copyright(C2018 Qualtrics. Qualtrics and all other Qualtrics product or service names are registered trademarks or trademarks of Qualtrics, Provo, UT, USA. http://www.qualtrics.com.

