Questioning and Asserting at the Same Time: the L% Tone in A-not-A questions

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1 Introduction

Mandarin A-not-A questions, hereafter referred to as ANAQs, have distinct syntactic and prosodic features. As shown in (1), ANAQs make both positive and negative answers explicit by conjoining the verb and its negative counterpart. Furthermore, ANAQs obligatorily end with a final low tone (see Section 2.2.2). These features distinguish ANAQs from *ma* questions (hereafter, MAQs), which lack a final low tone and only make the positive answer p syntactically explicit with the form *p-ma*, as shown in (2).

(1) Lin xihuan bu xihuan Wu?
Lin like not like Wu?
'Does Lin like or not like Wu?'

(2) Lin xihuan Wu ma?
Lin like Wu Q
'Does Lin like Wu?'

Another property of ANAQs is that they cannot be used when a possible answer to the question has been asserted. As in (3), B cannot use the ANAQ (1) when A has already provided the positive answer. Unlike the ANAQ, the MAQ (2) can be used by B in (3).

(3) A: Lin xihuan Wu. 'Lin likes Wu.' B: #(1) ✓(2)

In this paper, we show how the syntactic and prosodic features of ANAQs derive the neutrality requirement that ANAQs can only be used in neutral contexts. ANAQs have the same question meaning as MAQs (i.e., an update in the Question Under Discussion (QUD; Roberts, 1996)) AND the meaning of an assertion of $p \vee \neg p$. The reduplication feature R of ANAQs introduces a set which contains the positive answer p and the negative answer $\neg p$. The sentence final particle *ne* in ANAQs adds this set onto QUD and creates a disjunction, $p \vee \neg p$. The low boundary tone L%, represented as the ASSERT morpheme, attaches to the disjunction to create an assertion of $p \vee \neg p$. The assertion of $p \vee \neg p$ indicates the speaker's ignorance about the issue p or $\neg p$ and thus requires a neutral context. When a possible answer is presented, the context is not neutral, therefore ANAQs cannot be used. Our analysis also predicts the similarities and differences between ANAQs and alternative questions (hereafter, ALTQs) with the form 'p or not p'. We will specify the semantics of ANAQs in Section 2, and then turn to the discussion of ANAQs and ALTQs in Section 3. Section 4 concludes this study.

2 Mandarin A-not-A questions (ANAQs)

Section 2.1 shows that ANAQs can only be used in neutral contexts. In Section 2.2, we explain this neutrality requirement by proposing that ANAQs update the QUD and make an assertion p $\vee\neg$p.

2.1 Neutrality Requirement

Our empirical observation regarding ANAQs is summarized in (4).

(4) Unlike MAQs, ANAQs can only be used in neutral contexts, i.e., cannot be used in biased contexts.

The concept of 'biased context' in (4) is based on Gunlogson's (2003) proposal, given in (5). If a proposition p is publicly asserted by one discourse participant, it is possible that both participants commit themselves to p in the end. However, there is no possibility that both participants are committed to ¬p. In other words, the context is biased towards p in the sense that it is possible that p is in the Common Ground (referred to as the CG, a set of propositions representing the common belief shared by all the discourse participants, Stalnaker, 1978) and it is impossible that ¬p is in the CG. Therefore, the context is neutral with respect to an issue if no one publicly asserted a proposition about this issue before.

(5) If a proposition p is publicly asserted and ¬p is not publicly asserted, the context is biased towards p. (Modified from Gunlogson, 2003)

Let us motivate (4) with examples. In (6), no information about Lin's feeling towards Wu has ever been mentioned before, and thus the context is neutral towards the issue whether Lin likes Wu. The speaker can use either an ANAQ or a MAQ to seek the information.

(6) Context: Your friend arranged a blind date for Lin and Wu. After the date, you ask your friend:
A: Lin xihuan bu xihuan Wu? (ANAQ) A′: Lin xihuan Wu ma? (MAQ)

MAQs can also be used in biased contexts as seen in (3). In (3), one discourse participant A already asserted p 'Lin likes Wu' in the previous context. The context is biased towards p. The MAQ used by B indicates B's doubt towards p and his request for more evidence for p. ANAQs are infelicitous in such biased contexts.

To summarize, an ANAQ can only be used in neutral contexts where no possible answers to the question have been asserted before.

2.2 Semantics of ANAQs: Deriving the Neutrality Requirement

This section derives the meaning of ANAQs compositionally from the meaning of a feature R, the sentence final particle *ne* and the low boundary tone L%.

2.2.1 The Feature R and the Particle *ne*

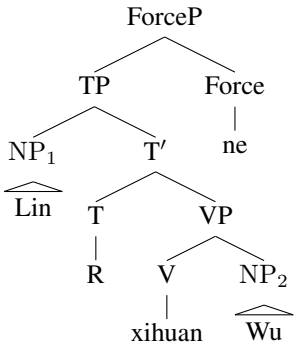
Our proposals regarding the compositional analysis of ANAQs are summarized as below:

(7) a. The feature R, located between the subject NP and the VP in the deep structure of ANAQs, is realized by a reduplication rule.
b. The feature R combines with the VP and the subject NP to create a set which contains a proposition p 'NP VP' and its negative counterpart.
c. The sentence final particle *ne* adds this set onto QUD and creates a disjunction, p ∨¬p.

Now, let us illustrate these proposals. (7-a) is based on Huang's (1991) analysis of ANAQs. Following Huang (1991), we propose that the ANAQ in (1), repeated here as (8), is derived from the deep structure in (9). The feature R is realized by a reduplication rule, which copies a sequence following T and inserts *bu* 'not' between the original and its copy. Here, R copies the verb *xihuan*, leading to the structure in (8). The sentence final particle *ne* optionally occurs in ANAQs, ALTQs and *wh*-questions in Mandarin. This *ne* particle introduces the interrogative force, and thus occupies the head position of a Force Phrase (ForceP).

(8) Lin xihuan bu xihuan Wu (ne)?
Lin like not like Wu Q?
'Does Lin like or not like Wu?'

(9)



(7-b) specifies the semantics of the feature R. We propose that the semantics of R is as in (10). According to (10), the feature R combines with the VP and the subject NP to create a set which contains a proposition and its negative counterpart, as shown in (11).

(10) $[\![\text{R}]\!] = \lambda P.\lambda x.\{P(x), \neg P(x)\}$

(11) $[\![\text{TP}]\!]$ = $[\![\text{R(like.Wu)(Lin)}]\!]$ = {'Lin likes Wu', 'Lin does not like Wu'}

(7-c) characterizes the semantics of the particle *ne*. The particle *ne* introduces an interrogative force head Q_1. As in (12), the semantics of Q_1 consists of two formulae: 1) a primary formula $\lambda S.\lambda$C. [QUD(C) + S], which takes in a set of propositions (Hamblin, 1973) and then adds this set onto the QUD à la Roberts. '+' is an update function which adds a set of propositions to a discourse context (Heim, 1982). As a result, QUD(C) + S is a context that resembles QUD(C) except that QUD(C) + S now contains S as the most immediate question under discussion. 2) a secondary formula $\lambda S.(r_1 \vee r_2 \vee ... \vee r_{|S|})$, which takes in a set of propositions and yields the disjunction of all the propositions in the set.

(12) $[\![\text{Q}_1]\!] = \lambda S.\lambda\text{C}.\ [\text{QUD(C)} + S] \ \times \ \lambda S.(r_1 \vee r_2 \vee ... \vee r_{|S|}),\ r_i \in S$ for all $1 < i \leqslant |S|$
(Notation: If p and q are formulae, p × q is a formula, where p is the primary formula, q is the secondary formula; S is of type $\langle\langle s,t\rangle,t\rangle$.)

The interpretation of the ForceP in (9) is given in (13).

(13) $[\![\text{ForceP}]\!] = [\![\text{Q}_1]\!]([\![\text{TP}]\!]) = \lambda$C. [QUD(C)+ {p, ¬p}] × (p ∨¬p) p = 'Lin likes Wu'

In summary, the feature R produces a set of propositions. The particle *ne* adds this set onto QUD, i.e., produces a question meaning, and then creates a disjunction of the propositions in the set.

2.2.2 The low boundary tone L% in ANAQs

An ANAQ is made up of a ForceP and the final low tone. The last section derived the meaning of the ForceP. Now we need to obtain the meaning of the final low tone. To see this, this section compares the intonation of ANAQs with the intonations of declaratives, ALTQs and MAQs.

Shen (1990) points out that MAQs end with a final rise tone, while ANAQs end with a final fall tone, which is the characteristic of declarative intonation. This distinction is depicted in Figure 1, which is a summary of Shen (1990) given by Schack (2000). Shen (1990) also concludes that ALTQs and Mandarin *wh*-questions share the same intonation pattern with ANAQs and end with a final low tone.

Shen's (1990) conclusion is supported by our case study of a Mandarin speaker, who is the first author of this paper. We recorded four utterances: a declarative, a MAQ, an ANAQ and an ALTQ, and analyzed them in the Pan-Mandarin ToBI system (Peng et al., 2005). In the test sentence *Wulin na yinyu* 'Wuli carries silver-fish', each syllable is pronounced with tone 2 (the mid-rising tone, labeled as 35).

As can be seen from Figure 2 to Figure 5,[1] ANAQs and ALTQs end with the low boundary tone L%, just like the declarative. In contrast, MAQs end with the high boundary tone H%.

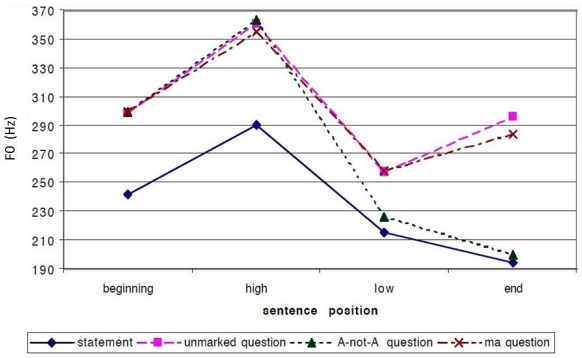


Figure 1: The average F0 in Shen's study

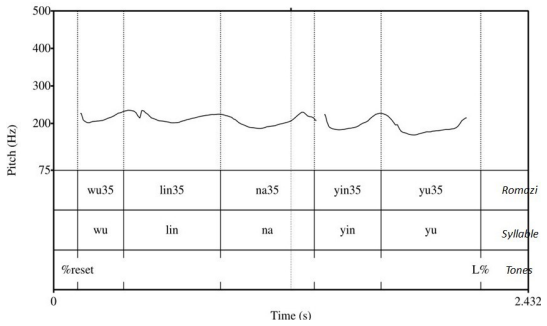


Figure 2: Declarative 'Wulin carries silver-fish.'

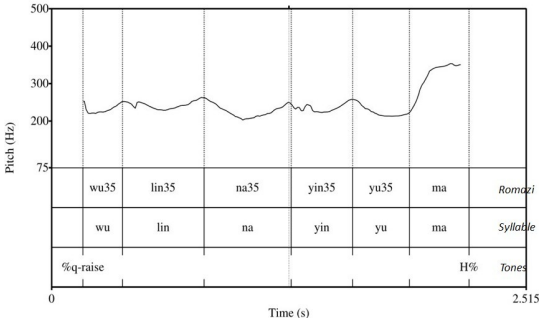


Figure 3: MAQ 'Does Wulin carry silver-fish?'

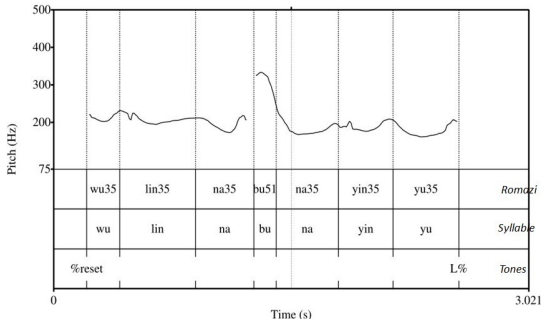


Figure 4: ANAQ 'Does Wulin carry or not carry silver-fish?'

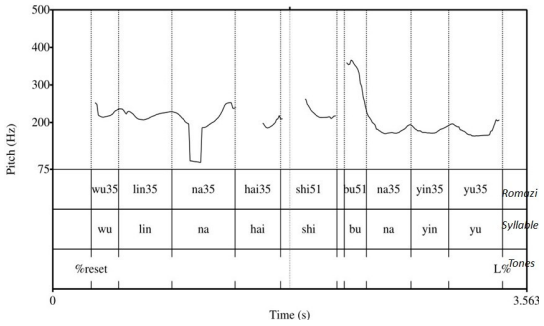


Figure 5: ALTQ 'Does Wulin carry or not carry silver-fish?'

In a nutshell, declaratives, ANAQs and ALTQs are marked by the low boundary tone L%, whereas MAQs are marked by the high boundary tone H%.

2.2.3 L% as ASSERT and paratactic association

In this section, we propose that the low boundary tone L% provides an assertive force. We show how the paratactic association of L% to the ForceP create an assertion 'p $\vee\neg$p', and derive the speaker's ignorance towards the issue p or not p from this assertion.

[1] Since we are only interested in boundary tones, we adopt only three tiers: Romanisation, Syllables and Tones, out of the seven tiers in the Pan-Mandarin ToBI annotation system.

Our proposals regarding the semantics of ANAQs are summarized as below:

(14) a. L% in ANAQs and declaratives represents the abstract ASSERT morpheme.
b. ASSERT is paratactically attached to the secondary formula 'p $\vee\neg$p' to produce an assertion 'p $\vee\neg$p'
c. The assertion 'p $\vee\neg$p' indicates the speaker's ignorance and thus requires a neutral context.

First, let us illustrate (14-a) and (14-b). Our idea of associating the meaning of L% with the meaning of ForceP is inspired by Bartels (1997). Bartels (1997) proposes that English ALTQs end with the low phrasal tone L- (See also Pruitt & Roelofsen, to appear), and that L- tone represents the abstract ASSERT morpheme. ASSERT is paratactically associated with ALTQs and performs the dynamic assertive update.

Following Bartels (1997), we propose that the low boundary tone L% in Mandarin declaratives, ANAQs and ALTQs represents the ASSERT morpheme. ASSERT is attached to ANAQs by paratactic association, that is, ASSERT is not integrated with the sentence syntactically, but paratactically attached to either of the two formulae in (13). Since ASSERT is a force head of type $\langle\langle s,t\rangle, \langle c,c\rangle\rangle$, ASSERT should be attached to the secondary formula p $\vee\neg$p (of $\langle s,t\rangle$ type) rather than the primary formula λC. [QUD(C)+ {p, $\neg$p}] (of $\langle c,c\rangle$ type).

After the paratactic association of the low boundary tone, we obtain the semantics of (8) as in (15). The semantics of an ANAQ consists of two parts: 1) the primary meaning λC. [QUD(C)+ {p, $\neg$p}], which updates the QUD with the set {p, $\neg$p}; 2) the secondary meaning, i.e., an assertion 'p$\vee\neg$p'.

(15) λC. [QUD(C)+ {p, $\neg$p}] $\times$ ASSERT(p $\vee\neg$p) p = 'Lin likes Wu'

Now, let us expand the proposal in (14-c), i.e., derive the speaker's ignorance from the assertion 'p$\vee\neg$p'. The proposition 'p $\vee\neg$p' is a tautology, i.e., the informativeness of this assertion is zero since it is always true. When the speaker asserts a tautology such as (16), the speaker can have at least three possible states of mind: First, the speaker in fact knows that Lin likes Wu (or knows that Lin does not like Wu), but does not want to provide the addressee with this information.

(16) Lin likes Wu or Lin does not like Wu.

Second, the speaker does not care whether Lin likes Wu or not. In other words, the speaker is indifferent to the issue.[2] Third, the speaker has no idea if Lin likes Wu or not, i.e., the speaker is ignorant about this issue. In case of ANAQs, the first two possibilities should be ruled out due to the incompatibility with the question meaning of ANAQs; thus, the assertion 'p $\vee$ $\neg$p' in ANAQs indicates the speaker's ignorance.

The first possibility that the speaker knows p but conceals this information is eliminated, because the speaker's knowledge about p would make the question act of ANAQs infelicitous. In Searle's (1969) theory of felicity conditions, an illocutionary act is felicitous only when it meets a set of conditions. For a question to be felicitous, it has to meet the following conditions:

(17) a. Preparatory: S [= speaker] does not know the answer to the question.
b. Sincerity: S wants the missing information. (Modified from Searle, 1969: 66)

[2]For example, in an unconditional like (i), the speaker indicates that whether Lin likes Wu or not does not matter to him.

(i) Whether Lin likes Wu or Lin does not like Wu, I recommend Wu to be our chairman.

Our analysis, together with Hamlin's (1973) pointwise application, ensures the right interpretation of A-not-A constructions in unconditionals, as in (ii). The particle *ne* and L% do not appear in (ii). Only the feature R makes its contribution. Thus, *xia bu xiayu* indicates a set which contains the two alternatives: p 'it rains' and $\neg$p 'It doesn't rain'. See also Rawlins (2008) for more discussions about unconditionals.

(ii) Mingtian xia bu xiayu wo dou yao qu yuanzu.
tomorrow rain not rain I DOU will go hike
'Whether it rains or not, I will go hiking tomorrow.'

(iii) $[\![$xia bu xiayu$]\!]$ = {p, $\neg$p} p = 'it rains'

Suppose that the speaker knew p. Then, the question act would be infelicitous, since both the preparatory condition and the sincerity condition are not met: the speaker knows the answer to the question, and the speaker does not want the information. Thus, the first possibility does not arise in case of ANAQs.

Now, let us see why the second possibility is eliminated. Suppose that the assertion 'p $\vee$ $\neg$p' represented the speaker's indifference towards the issue p or not p. Then, the meaning of an ANAQ would be contradictory: according to the primary meaning λC. [QUD(C)+ {p, $\neg$p}] of an ANAQ, the speaker adds the question onto QUD, indicating that the speaker is interested in the issue and thus seeks the answer. However, the assertion meaning says that the speaker is indifferent to this issue. Therefore, the indifferent reading of a tautology is incompatible with ANAQs.

Finally, the third interpretation, the speaker's ignorance towards the issue, is compatible with the question meaning (i.e., the speaker is interested in the issue). Therefore, the assertion 'p $\vee$ $\neg$p' in ANAQs indicates that the speaker is ignorant about the issue whether p or $\neg$p. In other words, the speaker is claiming that the probabilities of p and $\neg$p are the same in context C. Therefore, the assertion 'p$\vee\neg$p' indicates $P_{\mathrm{C}}(\mathrm{p})$=$P_{\mathrm{C}}(\neg\mathrm{p})$, i.e., the context is neutral. Thus, we rewrite (15) as (18). (18) shows that the speaker is ignorant towards the issue p or not p but not indifferent.

(18) The semantics of ANAQs: λC. [QUD(C)+ {p, $\neg$p}] $\times$ [$P_{\mathrm{C}}(\mathrm{p})$=$P_{\mathrm{C}}(\neg\mathrm{p})$]
(P_{C} is a probability function that takes a proposition and returns its probability in context c.)

The assertion meaning of ANAQs, i.e., $P_{\mathrm{C}}(\mathrm{p})$=$P_{\mathrm{C}}(\neg\mathrm{p})$, explains why ANAQs cannot occur in biased contexts. In biased contexts where one possible answer to the question has already been asserted, the context is biased towards p, i.e., the probability of p is larger than the probability of $\neg$p in context C ($P_{\mathrm{C}}(\mathrm{p}) > P_{\mathrm{C}}(\neg\mathrm{p})$). This contradicts the assertion meaning of ANAQs ($P_{\mathrm{C}}(\mathrm{p}) = P_{\mathrm{C}}(\neg\mathrm{p})$). Unlike ANAQs, MAQs simply indicate an update in the QUD.[3] MAQs lack the meaning of the assertion 'p$\vee\neg$p' and thus can occur when an answer has already been provided, as we have seen in Section 2.1.

In this section, we account for the neutrality requirement of ANAQs by proposing that ANAQs make an assertion p $\vee\neg$p and that this assertion indicates the speaker's ignorance. This assertion meaning is derived from the paratactic association of the low boundary tone L% with the ForceP.

3 ANAQs and alternative questions (ALTQs)

This section compares ANAQs with ALTQs in the form of 'p or not p'. We briefly show that following Levinson's (2000) M-principle, ALTQs with the form 'p or not p' can only be used in marked contexts.

A Mandarin ALTQ connecting two contradictory alternatives, as in (19), resembles an ANAQ except that *haishi* 'or' does not appear in the ANAQ. The disjunction *haishi* is used in questions and conditionals. The other disjunction *huo(zhe)* 'or' only occurs in declaratives, as in (20).

(19) Lin xihuan haishi bu xihuan Wu (ne)?
Lin like or not like Wu Q
'Does Lin like or not like Wu?'

(20) Lin xihuan Wu huozhe Zhang.
Lin like Wu or Zhang
'Lin likes Wu or Zhang.'

Like ANAQs, ALTQs cannot be used in biased contexts like (3). ALTQs with the form 'p or not p' are always used in forceful neutral contexts in which the speaker failed to get an answer before and is eager to get the answer this time. ANAQs are also felicitous in such contexts. As in (21), Li asked the question before but hasn't got the answer due to Xiaoming's contradictory statements. Now, Li can use either an ALTQ or an ANAQ to force the addressee to provide the answer immediately (See also Biezma, 2009).

[3] In Yuan and Hara (to appear), we propose that a MAQ introduces an interrogative force head Q_2, construed as a function from a proposition (of $\langle s,t\rangle$ type) to a CCP (of $\langle c,c\rangle$ type): $[\![\mathrm{Q}_2]\!]$ = $\lambda p.\lambda$C. [QUD(C) + $\{p, \neg p\}$].

(21) Li asks Xiaoming if he goes hiking tomorrow. Xiaoming says "Yes, I will go. Ah, I haven't finished my homework". Then, Li asks Xiaoming:

A:	Ni qu haishi bu qu?	Ni qu bu qu?
	you go or not go	you go not go
	'Do you go or not go?'(ALTQ)	'Do you go or not go?'(ANAQ)

The difference between these two questions is that ALTQs with the form 'p or not p' are infelicitous in examples like (22) whereas ANAQs are felicitous. (22) is a normal neutral context, but not a forceful context. It is impolite to use an ALTQ in (22), since the ALTQ with the form 'p or not p' indicates that the speaker is forcing the addressee to pick an answer from p and ¬p. The ANAQ does not have such a forceful connotation, and is felicitous in such a context.

(22) Context: You tell your friend that you are going hiking this weekend. Then, you ask him:

A: #Ni qu haishi bu qu?(ALTQ) ✓Ni qu bu qu?(ANAQ)

ALTQs with the form 'p or not p' cannot occur in biased contexts since they involve an assertion meaning, just like ANAQs. We propose that *haishi* collects two or more propositions and creates a set which contains these propositions,[4] as in (23). In p-or-not-p ALTQs, *haishi* creates a set {p, ¬p}. The particle *ne* adds this set onto QUD and creates a disjunction p ∨¬p. L% is paratactically associated to the sentence to produce an assertion 'p ∨¬p'. Thus, the p-or-not-p ALTQs have the same semantics as ANAQs, as in (24).[5] Both indicate the speaker's ignorance and require a neutral context.

(23) $[\![haishi]\!] = \lambda p_1 \ldots \lambda p_n . \{p_1, \ldots, p_n\}$, n⩾2.

(24) λC.[QUD(C)+ {p∨¬p}] × ASSERT(p∨¬p)

ALTQs with the form 'p or not p' can only be used in forceful neutral contexts, because they are marked expression compared with ANAQs and are thus infelicitous in unmarked contexts such as the normal neutral context. According to Levinson's M-principle (2000), the speaker cannot use a marked expression without reason. In other words, an abnormal and marked expression implicates a marked meaning and thus is used in a marked context. A speaker would violate the M-principle if he used a marked expression in an unmarked context. We speculate that ANAQs are unmarked expressions whereas ALTQs with the form 'p or not p' are marked.[6] Asking a question forcefully is a marked context compared with asking a question normally. Therefore, marked expressions, i.e., ALTQs with the form 'p or not p', are appropriate for marked forceful contexts. A speaker would violate the M-principle if he used ALTQs with the form 'p or not p' in an unmarked context like the normal neutral context.

This section discusses the differences between ALTQs and ANAQs. To avoid violating the M-principle, ALTQs with the form 'p or not p' can only be used in forceful neutral contexts.

4 Conclusion

In this paper, we presented a compositional semantics for Mandarin ANAQs. In ANAQs, the reduplication feature R produces a set which contains a proposition p and ¬p. The question operator *ne* combines with this set to update the QUD and to yield a proposition p ∨¬p. The low boundary tone L%, represented as the abstract ASSERT morpheme, attaches to p ∨¬p to produce the an assertion 'p ∨ ¬p'. This assertion

[4] *Huozhe* collects two or more propositions and yields the disjunction of these propositions.

[5] See Erlewine (to appear) for a similar derivation of the semantics of ALTQs.

[6] ANAQs are more unmarked than ALTQs with the form 'p or not p', since: 1) the former takes a shorter form than the latter; 2) the former can be used in more contexts than the latter; 3) the former is used much more frequently than the latter. We found 61320 ANAQs and only 193 ALTQs with the form 'p or not p' in the Modern Chinese Corpus of Center for Chinese Linguistics.

indicates that the speaker is ignorant towards the issue p or not p and thus requires that the context be neutral. Therefore, ANAQs cannot be used in biased contexts in which a possible answer has been asserted. ANAQs express two speech acts at the same time, i.e., assertion act and question act.

Our proposal accounts for the similarities and differences between ANAQs, MAQs and ALTQs. MAQs do not have an assertion meaning and thus can be used in biased contexts. ALTQs with the form 'p or not p' are more marked than ANAQs. Following the M-principle, ALTQs with the form 'p or not p' can only be used in a marked context, i.e., the forceful neutral context.

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