The semantics of the two kinds of questions in Mandarin: a case study of discourse adverbs
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The two types of questions in Mandarin, ma questions and A-not-A questions, are different in syntax and prosody. As shown in (1), ma questions, with the form p-ma, only make the positive answer p syntactically explicit, whereas A-not-A questions make both the positive and negative answers explicit by conjointing the verb and its negative counterpart. Also, unlike ma questions, A-not-A questions obligatorily occur with the final low phrasal tone L-.

Ni like Wu  Q Ni like-not-like Wu
‘Does Ni like Wu?’ ‘Does Ni like or not like Wu?’

Another difference between these two questions is that ma questions can co-occur with the adverb dique ‘indeed’, but A-not-A questions cannot, as shown in (2).1

(2) a. Ni dique xihuan Wu ma?  b. #Ni dique xihuan-bu-xihuan Wu?
Ni indeed like Wu  Q Ni indeed like-not-like Wu
‘Does Ni indeed like Wu?’ ‘#Does Ni indeed like or not like Wu?’

Our study explains this difference by specifying the semantics of ma questions and A-not-A questions. The main proposals are: Ma questions indicate an update in the Question Under Discussion (QUD; Roberts, 1996). A-not-A questions have the same question meaning as ma questions AND the meaning of an assertion p ∨ ¬p. The assertion of p ∨ ¬p, derived from the syntactic and prosodic features of A-not-A questions, indicates the speaker’s ignorance and thus requires that the context be neutral. Since dique requires that the context be biased towards the positive answer, dique can co-occur with ma questions but not with A-not-A questions.

The semantics of dique Yuan and Hara (2012) show that dique in an assertion p triggers a presupposition that p has been suggested, i.e., someone has indicated his/her bias towards p. E.g., Dique xiayu le ‘It indeed rained’ is felicitous only if ‘It rained’ has been suggested before.

Following Gunlogson (2003), we propose that the context is biased towards p, $P_c(p) > P_c(¬p)$, if someone’s bias towards p is known in the common ground (the CG, Stalnaker, 1978):

(3) In a context $C$, $P_c(p) > P_c(¬p)$ iff $(P_c(p) > P_c(¬p)) \in CG(C)$, where $x \in I(C)$, $I(C)$ returns the set of individuals in context $C$; $P_x(p)$ and $P_c(p)$ are probability distributions. $P_c(p)$ models x’s degree of belief in p; $P_c(p)$ models the probability of p in c.

We modify the definition of dique in Yuan and Hara (2012) as (4)2 on the basis of (3).

(4) $[\text{dique}] = \lambda p. \lambda F. \lambda C. F\text{-CG}(p)(C)(P_c(p)>P_c(¬p))$

Dique can occur in ma questions. A ma question with dique like (2-a) cannot be used as the initial utterance, unless ‘Ni likes Wu’ has been suggested before, as in (5).3

(5) A: Ni xihuan Wu.  B: Ni dique xihuan Wu ma?
‘Ni likes Wu.’ ‘Does Li indeed like Wu?’

Ma questions and dique We propose that a ma question introduces an interrogative force head $Q$, which puts a set $\{p, ¬p\}$ (Hamblin, 1973) into the QUD à la Roberts, as in (6).4 Thus, the utterance of p-ma? adds $\{p, ¬p\}$ onto the QUD as the immediate question in the stack.

(6) $[Q] = \text{INTER}$, where $\text{INTER} = \lambda p. \lambda C. [\text{QUD}(C)+\{p, ¬p\}]$

1This is not because A-not-A questions are incompatible with adverbs. Adverbs like daodi ‘after all’ can co-occur with A-not-A questions, as in Daodi xia mei xia ya? ‘After all, did it rain or not rain?’.

2$F$ is a variable over force heads, of type $\{(s, t), (c, e)\}$. c represents context type. Dique is of type $\{(s, t), (c, e)\}$. ‘$\cdot$’ is a presuppositor operator. If $\phi_{x,s}$ is a formula, $\pi$ is a presuppositor of $\phi$.

3Note that both A-not-A questions and ma questions can be used in out-of-blue contexts.

4In (6), ‘+’ is the update function which adds a set of propositions to a discourse context (Heim, 1982).
Now, let us see the contribution of *dique*. (7) shows the semantics of *ma* questions with *dique*. \( \{P_c(p) > P_c(\neg p)\} \) indicates that the positive answer to \( p \text{-} \text{ma}? \) has been suggested, while \( \lambda C. [\text{QUD}(C) + \{p, \neg p\}] \) shows that the speaker is still seeking the answer to \( p \text{-} \text{ma}? \). The combination results in the indication of the speaker’s doubt towards the suggested answer \( p \). E.g., in (5), B asks if Ni likes Wu although B knows that A suggested the positive answer. This means that B needs more evidence for verification.

(7) \[ \text{dique}(p)(Q_1) = \lambda C. [\text{QUD}(C) + \{p, \neg p\}](P_c(p) > P_c(\neg p)) \]

**A-not-A questions** Following Huang (1991), we argue that A-not-A questions like (1-b) are derived from the deep structure in (8). \( Q_2 \) is realized by a reduplication rule, which copies a sequence following T and inserts ‘not’ between the original and its copy. As in (9), we propose that the semantics of \( Q_2 \) consists of a primary formula \( \lambda P. \lambda x. \text{INTER}(P(x)) \), derived from the genuine question feature of A-not-A questions, and a secondary formula \( \lambda P. \lambda x. P(x) \vee \neg P(x) \), derived from the reduplication rule of \( Q_2 \). The interpretation of \( TP \) in (8) is in (10).

(8) \[ TP = \begin{array}{ll}
\text{TP} & \text{TP}
\end{array} \]

(9) \[ \{Q_2\} = \lambda P. \lambda x. \text{INTER}(P(x)) \times \{\lambda P. \lambda x. P(x) \vee \neg P(x)\} \]

(10) \[ \{TP\} = \{Q_2(\text{like.Wu(Ni)}) \} \times \{\text{INTER}(\text{like.Wu(Ni)}) \times \{\text{like.Wu(Ni) \vee \neg \text{like.Wu(Ni)}\} \}
\]

(11) \[ \{TP\} \times \{\text{L-}\} = \text{INTER}(p) \times \text{ASSERT}(p \vee \neg p) \]

The symbol ‘\( \otimes \)’ indicates that the low tone L- is paratactically associated with the A-not-A question.

Following Bartels (1997), we propose that the low tone L- in A-not-A questions represents the abstract ASSERT morpheme (which performs the dynamic assertive update), and ASSERT is attached to A-not-A questions by paratactic association. This means that ASSERT is not integrated into the A-not-A question syntactically, but can be paratactically associated with either of the two formulae in (10). Here, ASSERT cannot be associated with the primary formula, since ASSERT needs to be attached to a proposition and INTER(like.Wu(Ni)) is not a proposition. Thus, ASSERT is attached to \( (p \vee \neg p) \), as in (11). (11) is the interpretation of (1-b), showing that the semantics of A-not-A questions consists of two parts: 1) the primary meaning \( \text{INTER}(p) \), which is identical to the meaning of \( p \text{-} \text{ma}? \); 2) the secondary meaning, i.e., an assertion of \( (p \vee \neg p) \). Since \( (p \vee \neg p) \) is a tautology, asserting \( (p \vee \neg p) \) indicates that the speaker is ignorant about whether \( p \) or \( \neg p \) is true. In other words, the speaker is claiming that the probabilities of \( p \) and \( \neg p \) are the same. Based on (3), the assertion \( (p \vee \neg p) \) indicates \( P_c(p) = P_c(\neg p) \), i.e., the context is neutral. As summarized in (12), *ma* questions indicate the speaker’s interest in the issue ‘\( p \) or not \( p \)’, while A-not-A questions indicate the speaker’s interest and ignorance about ‘\( p \) or not \( p \)’.

(12) *ma* questions: \( \text{INTER}(p) = \lambda C. [\text{QUD}(C) + \{p, \neg p\}] \)

A-not-A questions: \( \text{INTER}(p) \times \text{ASSERT}(p \vee \neg p) = \lambda C. [\text{QUD}(C) + \{p, \neg p\}] \times P_c(p) = P_c(\neg p) \)

When *dique* is used, the context is biased towards \( p \) \( (P_c(p) > P_c(\neg p)) \). This contradicts with the secondary meaning of A-not-A questions \( (P_c(p) = P_c(\neg p)) \). *Ma* questions do not have the meaning of the assertion \( (p \vee \neg p) \). Therefore, *ma* questions can co-occur with *dique*.

**Conclusion** *Dique* requires that the positive answer has been suggested. Thus, *ma* questions with *dique* express the speaker’s doubt towards the suggested answer \( p \) and the speaker’s request for more evidence for \( p \). A-not-A questions, involving an assertion indicating the speaker’s ignorance about \( p \) or \( \neg p \), require that the context be neutral, whereas *dique* indicates that the context is biased. Due to this contradiction, *dique* cannot co-occur with A-not-A questions.