

Challenging the presuppositions of questions: the case of *ba*-interrogatives¹

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Abstract. This paper investigates the use of the Mandarin discourse particle *ba* in polar questions and *wh*-questions. With the introduction of a set of new scenarios where *ba*-interrogatives are (in-)felicitous, the paper shows that (i) *ba*-attached questions are typically used to challenge the presupposition of a contextually salient Question Under Discussion (henceforth QUD), and (ii) *ba* is particularly sensitive to the commitments from the addressee. These findings support the presence of a hierarchical discourse structure (Büring, 2003; Roberts, 1996), and the various components in the context.

Keywords: Discourse particles, QUD, Table stack, presupposition, Mandarin.

1. Introduction

Mandarin *ba* is one of the 28 discourse particles in the language (Chao, 1968). It typically occurs utterance-finally, and cannot be embedded. *ba* has been observed to occur both in declaratives, and in morphosyntactically-marked interrogatives². When *ba* attaches to declaratives, it adds the flavor of suggestion or uncertainty to the host, as shown in (1) and (2).

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|-----|----|----|-----|------------------------|-----|----|------|------|---------------|-----------|----|
| (1) | a. | ni | chi | | (2) | a. | ting | hao | de | | |
| | | | you | eat | | | | very | good | DE | |
| | | | | ‘Eat!’ | | | | | ‘Very | good.’ | |
| | b. | ni | chi | ba | | b. | ting | hao | de | ba | |
| | | | you | eat | BA | | | very | good | DE | BA |
| | | | | ‘(How about you) eat.’ | | | | | ‘(Maybe) very | good.’ | |

In the contrast shown in (1), *ba* turns a command to a suggestion. In (2), *ba* receives a modal-like interpretation. This ‘uncertainty’ meaning of *ba* can also be found in cases like (3b), where the *ba*-declarative can be translated as a confirmation-seeking question. For (3b), the speaker is unsure about the issue she expresses in a way that she needs the addressee to confirm. For (2b), no addressee’s reply is required.

- | | | | | | | | |
|-----|----|--------|----------|---|----|---------|-----------|
| (3) | a. | Yuehan | mingtian | hui | qu | xuexiao | |
| | | John | tomorrow | will | go | school | |
| | | | | ‘John will go to school tomorrow.’ | | | |
| | b. | Yuehan | mingtian | hui | qu | xuexiao | ba |
| | | John | tomorrow | will | go | school | BA |
| | | | | ‘John will go to school tomorrow, right?’ | | | |

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²In Mandarin, declaratives are usually not morphosyntactically-marked. Interrogatives can be marked in many ways: by sentence-final particle *ma*, by *wh*-words, by question intonation, etc. In this paper, I only discuss the relevant data of questions without *ma*, since *ma* and *ba* cannot co-occur.

ba-interrogatives, on the other hand, typically appear in “impatience” scenarios (Ettinger and Malamud, 2015), expressing the speaker’s impatience or anger. In (4) and (5), *ba* gives an additional “unfriendly” effect to the questions: the speaker is impatient about their current conversation status.

- (4) ni daodi yao shenme **ba**?
 you on-earth want what BA
 ‘(Tell me), what on earth do you want?’ (Chao 1968: 807)
- (5) Daodi shei qu **ba**?
 on-earth who go BA
 ‘Who is going anyway (I am losing my patience now!)?’ (Han 1995: 101)

ba’s meaning in declaratives has been widely discussed in the previous literature. For instance, Li and Thompson (1989) have described the function of *ba* as ‘soliciting-agreement’. Han (1995) proposes that *ba* weakens the “neustic” in declaratives and imperatives. Chu (2009) generalizes the uses of *ba* as ‘uncertainty’. More recently, Ettinger and Malamud (2015) try to provide a unified account of the meaning of *ba*. They argue that *ba* serves to weaken the force of the assertion or the directive it attaches to³, and correctly point out that *ba*-interrogatives are only felicitous in very restricted discourse contexts (i.e. the “impatience” scenarios). While capturing some crucial intuitions about the meaning of *ba*, Ettinger and Malamud (2015) fail to integrate the so-called “impatience” condition into an overall account of the semantics and pragmatics of *ba*-interrogatives. I will show in paper that the stipulation of adding “impatience” seems coarse-grained.

The paper has two goals. First, concentrating on the data of *ba*-interrogatives as in (4) and (5), I show that *ba*-interrogatives traverse the discourse trees upward (a.o., Büring, 2003; Rojas-Esponda, 2014): *ba* can either attach to the contextually salient QUD, or to a question challenging the presupposition of the QUD. I propose that *ba* adds two contextual preconditions, from which the “unfriendly” effect carried by *ba*-interrogatives is derived. Second, departing from Mandarin, I further compare *ba* with a set of discourse particles which share the use of challenging presuppositions (e.g. German *überhaupt* in Rojas-Esponda, 2014; English *even* in Iatridou and Tatevosov, 2016), but differ in additional restrictions on the contexts in which they can be used felicitously. I show that the contextual restrictions which license *ba* can be used to explain the (in-)felicity of other presupposition-challenging particles in similar scenarios, which will provide insights into subtle differences in the meaning and use of pragmatically similar discourse particles.

The paper is structured as follows: §2 presents the typical “impatience” scenarios where *ba*-interrogatives are felicitous, as well as the “out-of-the-blue” scenarios where *ba*-questions cannot be felicitously used. §3 proposes two preconditions on *ba* regarding how *ba* is used to signal the intended discourse tree. §4 compares *ba* with three other discourse particles: Mandarin *a*, German *überhaupt*, and English *even*. I use the proposed preconditions to “parameterize” the different uses among these presupposition-challenging particles (e.g. particles from different languages may be sensitive to different contextual components). §5 concludes.

³Imperatives are not necessarily marked in Mandarin. When strings like (1) and (2) are used for directive speech acts, Ettinger and Malamud (2015) call them imperatives.

2. Scenarios for *ba*-interrogatives

This section aims to narrow down the contexts where *ba*-interrogatives are felicitous. It has been noticed for a long time that whether *ba* is felicitous in a question depends on the previous discourse. In truly out-of-the-blue scenarios, certain *ba*-questions such as (6) are infelicitous. But if we modify the scenario by adding a suitable previous discourse moves, as in (7), the same *ba*-question becomes felicitous.

(6) [A approaches a stranger in a classroom.]

A: buhaoyisi, zhe ti zenme zuo (#**ba**)?
excuse-me this problem how do BA

A: ‘Excuse me, (do you know) how to solve this problem (#**ba**)?’

(7) [A and B have been discussing how to solve a mathematical problem for a long time. B rejected every solution that A provided, A to B:]

A: zhe ti zenme zuo **ba**?
this problem how do BA

‘(Come on), how to do this problem?’

In a scenario like in (7), which is dubbed as “impatience” scenarios by Ettinger and Malamud (2015), *ba*-questions typically show “unfriendly” effect: after making several unsuccessful attempts of resolving a mathematical problem, the speaker becomes impatient and thus asks a *ba*-question to request a solution.

Previous literature have noticed the necessity of the speaker’s impatience for *ba*-interrogatives to appear (a.o., Chao, 1968; Han, 1995; Ettinger and Malamud, 2015). However, as mentioned in §1, the impatience condition is somewhat ad hoc, if we re-exemplify the scenario in (7) as follows:

(8) [A is trying to solve a mathematical problem of which B knows the solution.]

i. A: Does the Lagrange theorem help?

ii. B: No.

iii. A: Hmm...will the Fourier expansion do the trick?

iv. B: No.

v. A: # lianshifaze shi bu shi daan **ba**?
chain-rule is NEG is answer BA

A: ‘Is chain rule the answer?’

(8) is a possible expanded conversation of the scenario in (7). At the point where A is asking the question (8v), we can infer from the previous conversation that A should have already been impatient on offering possible solutions. Although the impatience condition is satisfied in the scenario in (8), as we can see, the *ba* question (8v) is still infelicitous. This suggests that rather than the speaker’s impatience, *ba* is particularly sensitive to the form and the content of the

questions it attaches to. The infelicity of (8v) thus raises the question of what exactly are the pragmatic conditions that license *ba*-interrogatives, which we will further discuss in the rest of the section.⁴

2.1. (In-)felicitous uses of *ba*-interrogatives

Let us first consider the CAKE CASE in example (9). The scenario in (9) exemplifies a context where two kinds of *ba*-interrogatives are felicitous (9vi and 9vii). First, notice that in (9) the picky child B makes a public commitment at the beginning of the conversation; that is, there is some cake that B will eat, by uttering (9i). Inducing by the commitment (9i), in the following conversation the mother A attempts to figure out the general question of *what cake B will eat* by asking two more specific questions (9ii) and (9iv). After receiving two negative answers from B, A is losing her patience and uses a *ba*-question strategy to terminate the conversation: A can either ask the general question (i.e. the QUD) with *ba* explicitly (9vi), or a question challenging the presupposition of the general question with *ba* as in (9vii). Note that the underlined part in (9vi) and (9vii) signals that they are syntactically-marked interrogatives: *shenme* is a *wh*-word, meaning ‘what’; and *chi-bu-chi* is an A-not-A construction, marking one type of polar questions in Mandarin.

(9) THE CAKE CASE:

[A = Mother, B = picky child. The mother only prepares two kinds of cake for dinner: strawberry and chocolate.]

- | | |
|--|--|
| i. B: wo xiang chi dangao. | B: I want to eat cake. |
| ii. A: hao, ni chi bu chi caomei dangao? | A: Okay, will you eat strawberry cake? |
| iii. B: bu. | B: No. |
| iv. A: ni chi bu chi qiaokeli dangao? | A: Will you eat chocolate cake? |
| v. B: bu. | B: No. |
| vi. A: ni chi <u>shenme</u> dangao ba ? | A: What cake will you eat ba ? |
| vii. A': ni <u>chi bu chi</u> dangao ba ? | A': Will you eat cake ba ? |

Similar to the contrast between example (7) and (8), the *ba*-question (10i) cannot be felicitously used in the scenario in (9). That is, *ba* cannot attach to a question which is in the same form as the specific questions being asked in the previous conversation. The question (10ii), which is the presupposition-challenging question without *ba* attaching, is also infelicitous in the CAKE CASE. The reason of the infelicity of (10ii) is evident: with B's commitment (10i), asking (10ii) would simply be redundant.

(10) THE CAKE CASE (continued): A = Mother, B = Picky child

- | | |
|--|---|
| i. A'': # ni <u>chi bu chi</u> nailao dangao ba ? | A'': Will you eat cheese cake ba ? |
| ii. A''': # ni <u>chi bu chi</u> dangao? | A''': Will you eat cake? |

⁴Another common position taken in the literature (never systematically discussed though), also mentioned by Ettinger and Malamud (2015), is that a *ba*-question can be regarded as a question embedded under an implicit imperative, as the *ba*-question in (7) carries the meaning of ‘(tell me) how to solve the problem’. In this paper, I stand with Ettinger and Malamud (2015) in that this approach involves too many stipulations on the implicit structures, and there is no good explanation on why these implicit materials should be licensed here.

B's commitment in the CAKE CASE is necessary for *ba*-questions to be felicitous. In a modified scenario in (11), where the addressee B's commitment is absent, asking a *ba*-question to challenge the presupposition of the QUD becomes infelicitous since here 'B eats cake' is simply the speaker A's implicit assumption.

- (11) THE CAKE CASE (no commitment):
 [B is having dinner in A's house. A plans to serve some cake as dessert now.]
- | | |
|---|---------------------------------------|
| i. A: ni chi bu chi caomei dangao? | A: Will you eat strawberry cake? |
| ii. B: bu. | B: No. |
| iii. A: ni chi bu chi qiaokeli dangao? | A: Will you eat chocolate cake? |
| iv. B: bu. | B: No. |
| v. A: # ni chi <u>shenme</u> dangao ba ? | A: What cake will you eat ba ? |
| vi. A': # ni <u>chi bu chi</u> dangao ba ? | A': Will you eat cake ba ? |

Before we make the conditions for *ba*-questions more precise in the next section, let us consider one more scenario to familiarize ourselves with the felicitous contexts of *ba*-questions:

- (12) THE TRAVEL CASE:
 [B plans to visit A, and they live in different cities. Valid transportation between the two cities involves plane, train, and bus, assuming that there is no notable downsides for each of the three methods.]
- | | |
|--|---|
| i. B: wo xiazhouliu qu. | B: I will go (to your place) next Saturday. |
| ii. A: ni zuo bu zuo feiji lai? | A: Are you coming by air? |
| iii. B: bu. | B: No. |
| iv. A: ni zuo bu zuo huoche lai? | A: Are you coming by train? |
| v. B: bu. | B: No. |
| vi. A: ni zuo bu zuo qiche lai? | A: Are you coming by bus? |
| vii. B: bu. | B: No. |
| viii. A: ni <u>zenme</u> lai ba ? | A: How do you (plan to) come ba ? |
| ix. A': ni <u>lai bu lai</u> ba ? | A': Are you coming ba ? |

The TRAVEL CASE in (12) provides us with another typical scenario where *ba*-interrogatives can appear. All the contextual factors that *ba* is sensitive to are satisfied in the given scenario: the addressee B's **commitment** to the presupposition of the QUD (*are you coming?*), and several **unsuccessful attempts** of resolving the QUD in the previous conversation. What is worth noting for this scenario is that the interlocutors have exhaustified all the possible means of traveling between the two cities before asking a *ba*-question. An exhaustification of all the possible alternatives can also be found in the CAKE CASE: all kinds of cake the mother has on hand are strawberry and chocolate. This factor plays a crucial role in both scenarios: only when the speaker cannot think of any other possible alternatives can a *ba*-question be felicitously asked. The intuition behind this exhaustification condition is that asking a *ba*-question to challenge the validity of the QUD would be improper unless the previous discourse signals that the QUD is not answerable.

For an example that illustrates this point, consider (13). In this scenario, A obviously knows that not all students are excluded by B's negative replies, so the possible alternatives of the QUD are not exhausted. Here, the infelicity of the question is due to the presence of *ba*. If *ba* is omitted, A's question becomes acceptable very naturally.

(13) THE NAMELIST CASE (no exhaustification):

[A and B are organizing a class-internal party. There are six students including A and B in the class in total.]

- | | | |
|------|---------------------------------|--------------------------------------|
| i. | B: mingdan queding le. | B: The namelist has been determined. |
| ii. | A: Su qu bu qu? | A: Is Sue going? |
| iii. | B: bu. | B: No. |
| iv. | A: Bier qu bu qu? | A: Is Bill going? |
| v. | B: bu. | B: No. |
| vi. | A: # <u>shei</u> qu ba ? | A: Who goes ba ? |

The scenario in (13) again demonstrates that a more restrictive set of conditions for *ba*-questions is needed: even if in (13) *ba* attaches to the right 'type' of question (i.e. the QUD), and the context satisfies the commitment condition, the *ba*-question (13vi) is still not felicitous. In other words, an account for *ba*-questions should be able to explain *ba*'s sensitiveness of the content of the questions, as well as how the commitment and the exhaustification condition are formulated. To foreshadow a bit, in the next section we will formalize the two conditions discussed here as *ba*'s two *preconditions* within the Table model proposed by Farkas and Bruce (2010). We will show that the discourse leading to *ba*-questions requires a conflict to exist in the context: the addressee has been committed to the presupposition that the QUD is answerable, whereas the unsuccessful attempts of resolving the QUD in the previous conversation signal that the QUD might not be answerable. The implied impatience or anger of a *ba*-interrogative is thus generated from this conflict.

2.2. Summary of the data

So far from the empirical data we have observed that (i) *ba* selects a particular type of questions, and (ii) a *ba*-marked question specifies two necessary preconditions for the previous context. Preliminary generalizations are made in (14) and (15).

(14) **Questions** that *ba* can attach to:

- a. the current Question Under Discussion;
- b. questions challenging the presupposition of the QUD.

(15) **Descriptive generalizations:**

A *ba*-interrogative can be used felicitously only if:

- a. the addressee is committed to the presupposition of the QUD;
- b. the previous conversation signals that the QUD has no true answer (i.e., that the residual answer is true; Hamblin, 1973).

3. Proposal

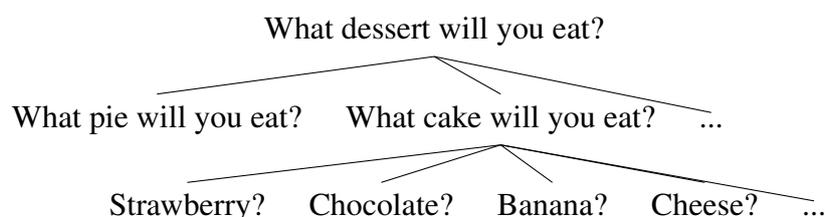
In this section I will give an account of the behavior of *ba* in questions which contains two parts. First, I argue that *ba*-interrogatives traverse the discourse trees upward. Second, I propose two preconditions on the input context of *ba*-interrogatives, formalized within Farkas and Bruce (2010)'s Table model, which allows for an account of the asymmetry of the commitments of discourse participants. §3.1 discusses how *ba*-interrogatives inform the hierarchical discourse structure. §3.2 introduces theoretical preliminaries. §3.3 lay out the core proposal, the two preconditions, and sample updates on the input contexts of *ba*-questions. §3.4 discusses further predictions made by this proposal.

3.1. Mapping *ba*-interrogatives to discourse trees

I adopt the d-tree model (a.o. Roberts, 1996; Büring, 2003; Rojas-Esponda, 2014) in which conversations are modeled as a hierarchical structures of discourse moves. Each node in a d-tree represents a declarative or an interrogative sentence. These nodes can be understood either as questions set up for interlocutors to resolve or answers to these questions.

I argue that *ba*-interrogatives traverse the discourse trees upward as follows. To resolve a complex question (the QUD), interlocutors in a conversation may proceed from the complex question to several subquestions, i.e. simpler questions providing complete or partial answers to the complex question. The QUDs and their subquestions together form a discourse hierarchy, a d-tree, which contains a sequence of nodes of questions. (16) presents a possible d-tree of the conversation in (9).

(16)



Take the CAKE CASE scenario in (9) as an example. The QUD of the conversation is *what cake will you eat*, which is brought up by B's request (9i) *I want to eat cake*. By uttering (9i), the addressee makes sure that there should be at least some cake that she eats, which satisfies the commitment condition. Assuming this, the speaker uses several simpler subquestions (*Will you eat strawberry cake? Will you eat chocolate cake?*) as strategies to resolve the higher QUD. This is a natural flow within a d-tree, which goes from a higher node to lower nodes. However, as the conversation goes, the subquestions that the speaker asks seem to give the QUD the "residual" answer (Hamblin, 1973); in other words, the conversation signals that there is no true answer to the QUD. In this situation, it is reasonable for the speaker to perform two kinds of moves using *ba*: (i) the speaker assumes there should be no presupposition failure given the addressee's commitment, and asks for the answer to the QUD by explicitly uttering the QUD; (ii) doubting whether the QUD is valid by challenging the presupposition of the QUD.

(17) B: I want to eat cake.

(QUD: what cake will you eat?)

- A: Okay, will you eat strawberry cake? (daughter question)
 B: No.
 A: Will you eat chocolate cake? (daughter question)
 B: No.
 A: What cake will you eat **ba**? (QUD)
 A': Will you eat cake **ba**? (Presupposition-challenging)

The standard traversal rule of a d-tree corresponds to the linear order of the nodes, i.e. interlocutors may move from a node to its sister or daughter. I argue that a *ba*-interrogative marks a move from a node to its predecessors. The form of a *ba* questions explicitly reflects either the higher-level question itself or the presupposition of the parent node.

3.2. Theoretical background

In the literature discourse contexts have been introduced as a tuple consisting of different discourse components (a.o. Gunlogson, 2004; Farkas and Bruce, 2010; Rawlins, 2010; Farkas and Roelofsen, 2017). In this paper I adopt Farkas and Bruce (2010)'s model because the components in this model allow us to trace the source of the public commitments that each interlocutor make, as well as the potential of resolving the current issue predicted by updating the contexts.

Farkas & Bruce's model elaborates the Stalnakerian update of assertions in a way that it models an intermediate step in the update process: before updating the Common Ground, the content of an utterance is first put onto the Table; the addressee can either choose to accept or reject the proposals on the Table. The Common Ground is updated by the content only when the content is accepted by all interlocutors. The Table, a discourse component in Farkas and Bruce (2010)'s model, is defined as a stack of issues (sets of propositions). It keeps track of the proposals for updating the common ground. Apart from the Table, there are two other conversational components that play crucial roles in my account: the Discourse Commitments sets (DC_x) for each interlocutor x , and the Projected Set (PS). The DC_x s used in my account follow the definition of *public beliefs* proposed by Gunlogson (2004). According to Gunlogson's definition, a public belief of an individual is not necessarily a mutual belief, but propositions in DC_x s are also part of the Common Ground.

- (18) Let $CG\{A, B\}$ be the Common Ground of a discourse in which A and B are the individual discourse participants.
- a. DC_A of $CG\{A, B\} = \{p: 'A \text{ believes } p' \in CG\{A, B\}\}$
 - b. DC_B of $CG\{A, B\} = \{p: 'B \text{ believes } p' \in CG\{A, B\}\}$ (Gunlogson 2004: 41)

In order to show the different effects an assertion or a question makes to the contexts, Farkas and Bruce (2010) propose that moves placed on the Table simultaneously project a set of future common grounds, the Projected Set (PS). In other words, PS suggests possible ways of resolving the current issue. When an assertion is put on the Table, the PS will be updated by the proposition p . When a question is proposed, the PS will be updated by all the possible answers to the question Q , assuming that interrogatives denote sets of possible answers (Hamblin, 1973). The updating operation $PS \cup P$ is defined in (19), which says that an updated PS is a new collection of possible developments of the common ground, and each future cg is created by

adding one proposition in P to the previous cg . The future cgs in the new collection PS should be consistent; inconsistent future cgs will be eliminated.

(19) Definition of PS :

- a. Let $PS = \{cg_1, \dots, cg_n\}$ be a collection of sets of propositions (e.g. possible common grounds) and let $P = \{p_1, \dots, p_m\}$ be a set of propositions.
- b. $PS \bar{\cup} P = \{cg_i \cup \{p_j\} \mid cg_i \in PS \text{ and } p_j \in P \text{ and } \cap(cg_i \cup \{p_j\}) \neq \emptyset\}$
(i.e. only keeps the consistent future common grounds)

(Modified from Farkas and Bruce 2010)

In this spirit, I assume that a context c is a tuple $\langle A, T, DC_x, CG, PS \rangle$, shown in (20).

(20) Context $c = \langle A, T, DC_x, CG, PS \rangle$, where

- a. A a set of discourse participants (s for speaker, a for addressee);
- b. Common Ground (CG): the set of propositions that all discourse participants are publicly committed to;
- c. Discourse Commitments (DC_x): the set of propositions that each discourse participant is publicly committed to;
- d. The Table (T): a stack of sets of propositions (issues);
- e. Projected Set (PS): the set of supersets of the current CG that projects future common grounds relative to which the issue on the Table is decided.

Under this framework, the question operator **QUEST** is defined as shown below. It maps interrogative meanings Q and input contexts K_i to output contexts K_o . Only updated discourse components are listed below; unmentioned aspects remain the same as their inputs. The subscripts i and o stand for input and output respectively.

(21) $QUEST(Q, K_i) = K_o$:

- a. $T_o = PUSH(Q, T_i)$
- b. $PS_o = PS_i \bar{\cup} Q$

(Modified from Farkas & Bruce 2010)

(21) says that when a question Q is asked, the denotation of the question⁵ is pushed onto the top of the stack. Each proposition in the question Q can potentially update the CG. Thus the PS is updated with all the possible answers to Q . Usual stack operations are assumed, $PUSH(e, T)$ in (21a) represents the new stack obtained by adding the issue e onto the stack T (see also Farkas and Bruce, 2010).

3.3. The discourse dynamics of *ba*-interrogatives

With all the tools introduced in §3.2, we are now ready to formulate the preconditions for *ba*-interrogatives. We assume that adding *ba* to an interrogative does not change the denotation of the question, (i.e. $\llbracket \phi ? \rrbracket = \llbracket \phi - ba ? \rrbracket$), but introduces preconditions on the input contexts. In (22) cg represents a future common ground in the PS, and Q^+ represents the QUD.

⁵In Farkas and Bruce (2010)'s original proposal, items pushed onto the Table are pairs of denotations and syntactic structures of sentences. In (21) I omit the syntactic part since it is unrelated to what is under discussion here.

- (22) Formally, *ba* adds the following two preconditions:
- $\lambda w. \exists p \in Q^+[p(w)] \in DC_{a,i}$
 - $PS_i \bar{\cup} Q^+ = \emptyset$ (i.e. for all $cg \in PS_i, \cap(cg \cup \{\cup Q^+\}) = \emptyset$)

When (22a) and (22b) are satisfied, ϕ -*ba*? is felicitous only if $\llbracket \phi \rrbracket = Q^+$, or $\llbracket \phi \rrbracket = \{\cup Q^+, \overline{\cup Q^+}\}$

(22a) accounts for our first generalization (15a): the addressee must commit herself to the presupposition of the QUD before uttering *ba*-interrogatives. The formula in (14a) tells us that the proposition of there being a true answer to the Q^+ is in the addressee's input commitment set. (22b) sets a condition on the input PS such that updating the PS with the QUD Q^+ returns an empty set. In other words, all the future common grounds in the input PS for a *ba*-question should be inconsistent. This is similar to saying that the issue on the Table is not resolvable. This accounts for our second observation that before uttering *ba*-interrogatives the previous discourse seems to entail that Q^+ is not answerable.

Let us see how (22) implements our informal generalizations of the meaning contributions made by *ba*. Take conversation (9) again as an example. Before anything is uttered, we assume that the initial context state K_1 has the following structure:

- (23) K_1 : Initial context state

DC_s	TABLE	DC_a
$\{\dots\}$	$\langle \rangle$	$\{\dots\}$
COMMON GROUND cg		PROJECTED SET $PS = \{cg\}$

When (9i) *I want to eat cake* is uttered, the addressee is committed to there being a true answer to the QUD *what cake will you eat*. In other words, the addressee has committed herself to the proposition in the form of $p_1 \vee p_2$, assuming that only strawberry cake and chocolate cake count as possible answers to the QUD. When the speaker says *okay* in (9ii) and starts looking for an answer to the QUD, we assume that at this point both interlocutors agree that they are going to resolve this issue, and thus the QUD *what cake will you eat* is introduced and put onto the Table.

- (24) K_2 : The context state after *I want to eat cake*.

DC_s	TABLE	DC_a
$\{\dots\}$	$\langle \{p_1, p_2\}, \langle \rangle \rangle$	$\{p_1 \vee p_2, \dots\}$
$cg = \{p_1 \vee p_2, \dots\}$		$PS = \{cg \cup \{p_1\}, cg \cup \{p_2\}\}$

where $p_1 = a$ will eat strawberry cake, $p_2 = a$ will eat chocolate cake.

Next, the speaker asks a subquestion of the QUD, *will you eat strawberry cake*. The addressee, by answering with *no*, has committed herself to the proposition $\neg p_1$. Hence the DC_a , the CG,

and the PS are all updated with the proposition $\neg p_1$. We see that one of the future *cg* becomes inconsistent after updating with $\neg p_1$, and is thus discarded. The addressee’s answer completely resolves the subquestion, and thus the subquestion is popped off the stack. (25) shows the context state after updating with the addressee’s answer *no* in (9iii).

(25) K_3 : The context state after *-Will you eat strawberry cake? -No.*

DC _s	TABLE	DC _a
{...}	$\langle \{p_1, p_2\}, \langle \rangle \rangle$	$\{p_1 \vee p_2, \neg p_1, \dots\}$
$cg = \{p_1 \vee p_2, \neg p_1, \dots\}$	PS = $\{cg \cup \{p_1\} \cup \{\neg p_1\}, cg \cup \{p_2\} \cup \{\neg p_1\}\}$	

$p_1 = a$ will eat strawberry cake

The update of the second subquestion *will you eat chocolate cake* and its response *no* repeats the process in (25). After updating with the addressee’s commitment $\neg p_2$, the remaining future *cg* in the PS is inconsistent and is thus eliminated, the PS becomes empty, which satisfies the precondition (22b), the input $PS \cup Q^+ = \emptyset$. The PS turns out to be empty, but the issue (the QUD) is still on top of the Table, which gives us a conversational crisis. Notice also that the addressee’s commitment of there being a true answer to the QUD is in the DC_a, which satisfies the preconditions (22a). When the input preconditions are all satisfied, both *ba*-questions *what cake will you eat ba* (QUD restated) and *will you eat cake ba* (presupposition of the QUD) are possible moves.

(26) K_4 : The context state after *-Will you eat chocolate cake? -No.*

DC _s	TABLE	DC _a
{...}	$\langle \{p_1, p_2\}, \langle \rangle \rangle$	$\{p_1 \vee p_2, \neg p_1, \neg p_2, \dots\}$
$cg = \{p_1 \vee p_2, \neg p_1, \neg p_2, \dots\}$	PS = $\{cg \cup \{p_2\} \cup \{\neg p_1\} \cup \{\neg p_2\}\}$	

$p_2 = a$ will eat chocolate cake.

3.4. Further predictions

We find that if we form a scenario which satisfies both preconditions, but without a sequence of subquestions in a conversation, *ba*-questions can be acceptable as well.

(27) THE NAMELIST CASE

[Professor A and Professor B are organizing an open house event. There are three prospective students on the list: Sue, Bill, Mary.]

- i. B: The namelist has been determined.
- ii. A: Who is coming?
- iii. B: Well, Bill is not coming, Mary is not coming, Sue is not coming...
- iv. A: shei lai **ba**?
what come BA

A: ‘Who is coming **ba**?’

This observation can be predicted by the current proposal. In (27), B is committed to there being some students coming to the event since there seems to be a namelist of the event. What is different from the cases we have seen in §2 is that here the QUD is explicitly asked by the speaker, and no subquestion is being asked in the scenario in (27). Instead, B answers the QUD by denying all the possible answers to the QUD. So, after updating B’s answer in (27iii), the PS becomes empty as well, which satisfies our exhaustification condition. Since both preconditions are satisfied, a *ba*-question is predicted to be acceptable, which is the result we find in (27). Another possible scenario for exhaustifying all the possible answers is shown in (28).

- (28) [A is trying to push B to finish her homework. B is usually unreliable, and her words usually cannot be taken very seriously.]
- i. B: I will definitely finish it by the end of this week.
 - ii. A: Really? When do you plan to do it?
 - iii. B: Well, today, I guess...
 - iv. A: bukeneng, bie kaiwanxiao. ni dasuan shenmeshihou xie **ba**?
 NEG-possible NEG-joke you plan when write BA
 A: ‘That’s impossible, stop joking. When do you plan to write it **ba**?’

In (28), B responds to the QUD by providing an answer which both of the interlocutors consider as impossible. That is to say, the answer that B provides is outside the domain of the QUD, and thus is in the form of $\neg p_1 \wedge \neg p_2 \wedge \dots \wedge \neg p_n$. Updating the PS with an impossible answer will always result in an empty set. In this way, the scenario in (28) also satisfies both preconditions, and we find that a *ba*-question can appear in this scenario.

4. Crosslinguistic extensions

As mentioned above, there are several related particles which can also be used to challenge presuppositions, but the contexts where they appear are slightly different from *ba*’s. In this section I show how the proposed preconditions can be used to “parameterize” the different uses among these presupposition-challenging particles.

4.1. Mandarin *a*

a is a Mandarin discourse particle that is often used to express the speaker’s surprise or disbelief (29). It has been noted in the literature (e.g. Han, 1995) that particle *a* can also attach interrogatives in Mandarin, as shown in (30). But unlike *ba*-interrogatives, *a*-questions do not have ‘unfriendly’ effects. Rather than indicating a conversational crisis (Farkas and Bruce, 2010), the speaker uses an *a*-question to take a step back and politely ask if her implicit assumption is valid, otherwise the previous conversation built on the speaker’s assumption would be pointless.

- (29) *a* in declaratives:
 [A gives B a pineapple as a present, but B tells A that she is allergic to pineapples. A to B:]

ni bu neng chi boluo a
 you NEG can eat pineapples A

‘You cannot eat pineapples (you must be joking/that’s unexpected)!’

(30) *a* in interrogatives:

B: I heard that John is going to teach us math next semester.

A: buhaoyisi, dan Yuehan shi bu shi jiaoshou a?
 sorry but John is NEG is professor A

A: ‘I’m sorry, but is John a professor?’

Interestingly, an *a*-question can also be used in the CAKE CASE, but the proceeding context is different: *a*-questions are unacceptable if there is some addressee’s commitment in the previous discourse. A felicitous scenario for *a*-questions is shown in (31), where *a* is used to express the speaker’s surprise about the invalidity of her assumption of whether B eats cake (i.e. the presupposition of the QUD).

(31) THE CAKE CASE

~~B: I want to eat cake.~~

A: Will you eat strawberry cake?

B: No.

A: Will you eat chocolate cake?

B: No.

A: *ni chi shenme dangao a?/ni chi bu chi dangao a?*

A: What cake will you eat *a*?/Will you eat cake *a*?

4.2. German *überhaupt* and English *even*

Rojas-Esponda (2014) observes similar ‘stepping back’ effects of German particle *überhaupt*: *überhaupt*-marked questions can also be used to doubt the presupposition of the QUD, shown in (32).

(32) i. A: Möchtest du ein Glas Wein? A: Would you like a glass of wine?

ii. B: Nein, Danke. B: No, thank you.

iii. A: Hättest du gerne ein Bier? A: Would a beer appeal to you?

iv. B: Nein. B: No.

v. A: Trinkst du **überhaupt** Alkohol? A: Do you drink **überhaupt** alcohol?

(Rojas-Esponda 2014: 5)

überhaupt-marked questions behave systematically different from *ba*-interrogatives in that *überhaupt*-questions do not require the precondition of the addressee’s commitment as well, and hence they do not exhibit unfriendly effects, parallel with *a*-questions in Mandarin. Moreover, *überhaupt* can be used to challenge the standard existential presupposition in (33), while *ba* cannot.

(33) A: *Hat der König von Frankreich eine Glatze?*

A: Is the King of France bald?

- B: *Hat Frankreich überhaupt einen König?*
 B: Does France even have a king? (Rojas-Esponda 2014: 30)
- (34) A: *faguo guowang shi tutou ma?*
 A: Is the King of France bald?
 B: # *faguo youmeiyou guowang ba?*
 B: Does France even have a king?

Similar presupposition-challenging effects can also be found with English *even*. The difference between (33) and (35) is that what is challenged in (35) is rather A's assumption of B's knowledge of the proper name *Oleana*⁶.

- (35) A: Let's meet at Oleana for dinner. Is that okay?
 B: What is that **even**? (Iatridou and Tatevosov, 2016)

Again, *ba* cannot fit in the scenario in (35) which is felicitous for *even*.

- (36) A: Let's meet at Oleana for dinner. Is that okay?
 # *shenme shi Oleana ba?*
 what is Oleana Ba
 'What is Oleana?'

Here, for (33) we assume that the question *is the king of France bald?* is asked at that point and hence is put on the Table, but the presuppositions have not yet been checked or accommodated - so they are not yet in the Common Ground. Therefore, there is no conversational crisis happening when the other person questions the presuppositions (i.e. the exhaustification condition is not satisfied). In the cake sequence in (9), by contrast, the speaker A has already been playing along the QUD for a while, and thus it is very clear that the presuppositions of the QUD have been accepted for the purpose of that conversation. The contrast also implies that it is very important that there is an intermediate step in our model where the interrogative meaning is on the Table but its presuppositions need not yet be in the Common Ground.

⁶It is worth noting that there is some scenario where both *ba* and *even* are felicitous. Consider the following scenario (thanks to Hazel Pearson for bringing this up and creating the scenario):

- (1) [It's Friday today. B plans to go to A's place for dinner during the weekend, but they haven't decided on the date. B is usually very unreliable.]
 A: When do you plan to come?
 B: Tonight.
 [Friday night]
 B: Sorry I cannot make it tonight. I will come tomorrow.
 [Saturday night]
 B: Sorry I have some emergency to deal with. I will come tomorrow.
 [Sunday night]
 B: I am so sorry but I cannot come today.
 A: Do you **even** plan to come?!/Do you plan to come **ba**?

5. Conclusions

In this paper, I have discussed the usage of Mandarin particle *ba* in interrogatives, which typically generates the “unfriendly” effect. I have shown that *ba* is sensitive to the discourse hierarchy (d-trees): it can only attach to the QUD or presupposition-challenging questions. I proposed that a *ba*-interrogative carries two preconditions by which it (i) indicates a conversational crisis, and (ii) records the source of commitment so that it identifies who to “blame”. The paper also contributes to the discussion of presupposition-challenging particles.

For future directions, the first important question to ask is whether we can unify the uses of *ba* in declaratives and interrogatives. Secondly, it is still not clear why *ba* is sensitive to the QUD, which will also be an interesting question to investigate. Lastly, it seems that *ba* also interacts with different intonation contours in Mandarin (such as rising or falling), which opens another exciting field for us to explore.

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