

Mandarin Chinese *ma*: Q morpheme, SA intensifier, or PQP?*

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1. Introduction

One way to form a yes-no question in Mandarin is by using the sentence-final particle *ma*. An example is (1b), which builds on the declarative base in (1a).

- | | | | | |
|-----|----|---------------|----|-----------------------|
| (1) | a. | Xia yu le. | b. | Xia yu le <u>ma</u> ? |
| | | fall rain PRF | | fall rain PRF MA |
| | | ‘It rained.’ | | ‘Did it rain?’ |

This particle is traditionally considered unembeddable (e.g., Pan 2019), but recent observations show that *ma* may be embedded under restricted conditions (2).¹

- (2) John xiang zhidao [xia yu le ma zuotian].
John want know fall rain PRF MA yesterday
‘John wants to know whether it rained yesterday.’
(Bhatt and Dayal 2020:1122)

Theoretical proposals for *ma* make different predictions about the range of contexts that allow its embedding. Among many others: Cheng (1991) proposes that *ma* realizes a C⁰ and is a clause-typing question morpheme (3), Kim (2019) proposes that *ma* adjoins to a speech act phrase and is a speech act–intensifying operator (4), and more recently, Dayal

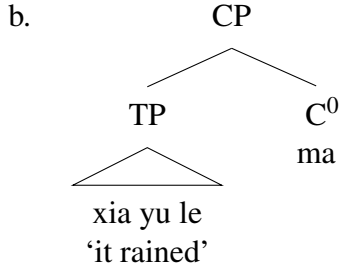
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¹Abbreviations used in glosses follow the Leipzig Glossing Rules.

(2023) proposes that *ma* resides in a perspective phrase between SAP and CP (5b) and triggers perspectival centering, introducing a semantic/pragmatic requirement that the CP question is p(otentially)-active for the perspectival center (5a).

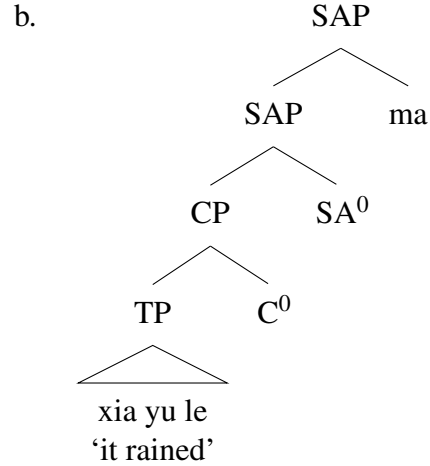
(3) *Cheng's CP proposal*

a. *Ma* types clauses as [+Q].



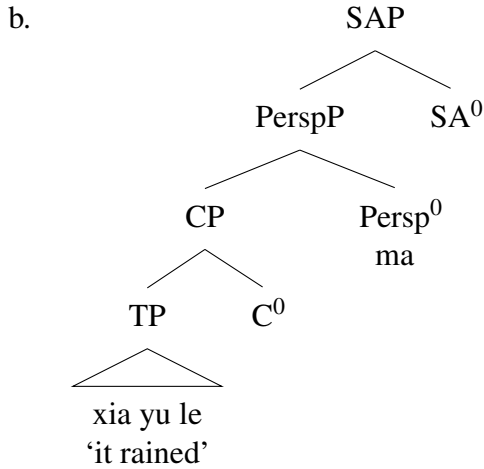
(4) *Kim's SAP proposal*

a. *Ma* intensifies speech acts.



(5) *Dayal's PerspP proposal*

a. $[[\text{Persp}^0]] = [\lambda Q. \lambda x: \text{p-active-for}(Q, x). Q]$
(Dayal 2023:11)



(cf. IAP in Woods 2016)

Using a novel paradigm for eliciting semantic judgments, this paper evaluates the competing theoretical proposals through a thorough examination of *ma*'s embeddability paradigm. The results support a new proposal that partially overlaps with the PerspP proposal, suggesting that *ma* introduces a semantic/pragmatic requirement on the perspectival center's ignorance and the addressee's knowledge of the answer to the question.

While the assumptions underlying the CP and SAP proposals are largely familiar, the PerspP proposal may require more detailed development. This is provided in section 2, which then puts forward the new proposal. Sections 3 to 4 report and discuss the methods and results of the novel semantic judgment elicitation paradigm. Section 5 concludes.

2. Background

The PerspP proposal is motivated by McCloskey's (2006) study of embedded inverted questions (EIQs) in, among other English varieties (Woods 2016), Irish English:

- (6) *Embedded inverted question*
[Every male physicist]_i wonders [will he_i be awarded a Nobel Prize].
(McCloskey 2006:89)

McCloskey convincingly shows that EIQs are not quotations, as personal pronouns would behave differently if they were. For example, as in (7), a 3SG personal pronoun in a quoted question would refer to someone else rather than being bound by the main subject.

- (7) *Quoted question*
[Every male physicist]_i wonders, ["Will he_{j/*i} be awarded a Nobel Prize?"]

The embeddability of EIQs is affected by at least three factors (McCloskey 2006, Dayal 2023): the matrix predicate type, subject person, and illocutionary force. In (8), when the matrix subject person (3rd) and illocutionary force (declarative) remain constant, changing the predicate (from *wonder* to *know*) affects felicity. Similar minimal pairs illustrating the effects of matrix subject person and illocutionary force are given in (9–10).

- (8) *Effect of matrix predicate type*
- | | | |
|----|---|--------------|
| a. | Mary _i wonders [will she _i be awarded a Nobel Prize]. | ✓wonder-type |
| b. | #Mary _i knows [will she _i be awarded a Nobel Prize]. | ✗know-type |
- (9) *Effect of matrix subject person*
- | | | |
|----|---|-------------|
| a. | Does Mary _i wonder [will she _i be awarded a Nobel Prize]? | ✓3rd person |
| b. | #Do I _i wonder [will I _i /she _j be awarded a Nobel Prize]? | ✗1st person |
- (10) *Effect of matrix illocutionary force*
- | | | |
|----|--|----------------|
| a. | Mary _i wonders [will she _i be awarded a Nobel Prize]. | ✓declarative |
| b. | #Does Mary _i wonder [will she _i be awarded a Nobel Prize]? | ✗interrogative |

It is important to emphasize that the contrast between *wonder*-type and *know*-type predicates in (8) does not align with the familiar distinction between rogatives and responsives. For instance, while *forget* is responsive like *know*, it nevertheless allows EIQs, as in (11), indicating that rogateness or responsiveness alone does not account for the pattern.

- (11) The chair has forgotten [did Ann get A's in her first year courses].
(Dayal 2023:24)

Instead, the relevant contrast concerns whether the predicate's semantics is compatible with contexts in which the subject may be ignorant of the answer to the embedded question, a property I refer to as *the ignorance requirement*. Predicates like *wonder* can satisfy the ignorance requirement, whereas predicates like *know* cannot. Following Dayal and Grimshaw's (2009) terminology, I refer to *wonder*-type predicates as *quasi subordinators* (QS) and *know*-type predicates as *non-quasi subordinators* (NQS). The table in (12) presents how this distinction diverges from the rogative-responsive classification.

		QS: $\Diamond \neg \text{know}(x, Q)$	NQS: $\Box \text{know}(x, Q)$
(12)	Rogative: [+Q]	<i>want to know, wonder</i>	
	Responsive: [$\pm$ Q]	<i>forget</i>	<i>know, remember</i>

With this clarification in place, the complete acceptability pattern of EIQs à la Dayal is presented in (13), where 0 and 1 represent unacceptability and acceptability, respectively.

	Force	Person	Paraphrase	QS (‘wonder’)	NQS (‘know’)
	DECL	1	‘I ...’	1	0
	DECL	2	‘You ...’	1	0
	DECL	3	‘Mary ...’	1	0
(13)	Q	1	‘Do I ...?’	0	0
	Q	2	‘Do you ...?’	0	1
	Q	3	‘Does Mary ...?’	0	1

Dayal captures this pattern by positing two distinct constraints. One of these constraints is the aforementioned ignorance requirement, which is introduced lexically via the p-activeness condition encoded in the denotation of Persp^0 , as illustrated in (14). In this configuration, the variable x is to be filled in by the reference of a covert pronoun in the specifier position of PerspP , which is bound by the speaker in the case of a matrix question and by a matrix argument — typically the subject — in the case of an embedded question.

- (14) *Ignorance requirement*
(Dayal 2023:11)

$$\begin{aligned}
 \text{a. } \llbracket \text{Persp}^0 \rrbracket &= [\lambda Q. \lambda x: \text{p-active-for}(Q, x). Q] &= (5a) \\
 \text{b. } \forall x \forall Q &[\text{p-active-for}(Q, x) \rightarrow \Diamond \neg \text{know}(x, \text{answer}(Q))]
 \end{aligned}$$

The other constraint in Dayal's proposal, which I refer to as *the resolution requirement*, primarily accounts for the unacceptability of QS interrogatives. This requirement is informally stated in (15).

(15) *Resolution requirement*

(If the matrix clause is a question,) a positive answer to the matrix question must lead to a resolution of the embedded question.

These two requirements help explain the complete acceptability pattern of EIQs.² Take (8b) and (10b) again as examples. The unacceptability of (8b) follows from the ignorance requirement, as the embedded question cannot be p-active for the matrix subject, given that Mary already knows its answer. Meanwhile, the unacceptability of (10b) reflects a violation of the resolution requirement: whether or not Mary wonders about the embedded question has no bearing on resolving it.

Building on the PerspP proposal, I advance a revised version, which I refer to as the *revised PerspP* (RPP) proposal. Like its predecessor, RPP incorporates the ignorance requirement, but it departs from the original PerspP proposal by replacing the resolution requirement with a distinct constraint, which I term *the knowledge requirement*:

(16) *Knowledge requirement*

It is possible that the addressee knows the answer.

Combining the ignorance requirement and the knowledge requirement yields the newly proposed denotation of *ma* as presented in (17), where the left hand side of the conjunction represents the ignorance requirement and the right hand side represents the knowledge requirement. The variable *x* is likewise to be filled in by the perspectival center.

$$(17) \quad \llbracket ma \rrbracket = [\lambda Q. \lambda x: \Diamond \neg \text{know}(x, \text{answer}(Q)) \wedge \Diamond \text{know}(\text{addressee}_C, \text{answer}(Q)). Q]$$

At this point, we have four distinct proposals that generate different predictions regarding the embeddability pattern of *ma*. These predictions are discussed in the following section.

3. Methods and predictions

To determine the most suitable proposal, I survey native Beijing Mandarin speakers and test how the matrix predicate type, subject person, and illocutionary force affect the embeddability of *ma* through a novel semantic judgment elicitation paradigm. These factors amount to 2 types $\times$ 3 persons $\times$ 2 forces = 12 conditions, each having four items in the survey, using different matrix predicates and embedded questions. An example item in the QS-3-DECL condition ('Mary wonders...') is (18).

- (18) Xiaohong_i xiang zhidao, [ta_i de fenshu bi wo_j gao ma?]
 Xiaohong want know 3SG POSS score than 1SG high MA
 'Xiaohong_i wants to know whether her_i score was higher than mine_j.'

²Although Dayal (2023) does not thoroughly explore the variations with QS predicates, the acceptability pattern reported in (13) is based on predictions by ignorance and resolution requirements.

The brackets, subscripts, and underlining are only for the reader's convenience and were not included in the survey. To ensure that the items cannot be read as quotations, all embedded questions contain a 3SG personal pronoun referring to the matrix subject (if 3SG) and a 1SG personal pronoun referring to the speaker. To discourage a reading in which *ma* takes scope over the matrix clause, a comma is added after the matrix predicate, and the embedded questions are ended with a question mark. All items are presented in a randomized order (unique to each participant).

The instruction in (19) is given at the beginning of the survey.

- (19) Below are some pairs of expressions, each with an accompanying context. In each pair of expressions, option (a) consists of two sentences, and option (b) attempts to convey the same meaning using only one sentence. Your task is to understand the accompanying context, read both expressions aloud, and decide whether the two sentences in (a) can be naturally conveyed using the single sentence in (b) in the accompanying context. If you believe it is possible, choose (b). If not, choose (a). If both (a) and (b) seem unacceptable for you, choose (a) as well.

As per the instruction, in the novel semantic judgment elicitation paradigm, each target (in option (b)) is presented with a two-sentence equivalent (in option (a)). In the two-sentence equivalent, the first and second sentences convey the matrix and embedded content of the target, respectively. To illustrate, (20) is the two-sentence equivalent of (18).

- (20) a. Xiaohong_i xiang zhidao yi jian shi.
Xiaohong want know one CLF thing
'Xiaohong_i wants to know one thing.'
- b. Na jiu shi [ta_i de fenshu shi bu shi bi wo_j gao].
that just COP 3SG POSS score COP not COP than 1SG high
'That thing is whether her_i score is higher than mine_j.'

This novel paradigm forces the participants to choose between two options conveying the same meaning (cf. Mahowald et al. 2016). One option is tedious, and the other succinct. If the participants prefer the tedious option, it suggests that the succinct option is semantically unacceptable, tempting them to use more sentences, and vice versa.

The results predicted by the proposals are summarized in (21), where 0 and 1 represent choosing the tedious and succinct options, respectively. The CP proposal predicts that the acceptability of embedded *ma* should in general be unaffected, but due to the peculiarity to query one's own knowledge or desire, the 1-Q conditions ('Do I...?') are excluded across the board. The SAP proposal predicts that the results follow the felicity conditions of the asking speech act, which necessitate the speaker not knowing the answer and believing that the addressee knows, resulting in the exclusion of QS-2-DECL ('You wonder...'), NQS-1-DECL ('I know...'), and 2-Q ('Do you...?'). The PerspP proposal predicts that the results mirror the distribution of (Irish) English EIQs, presented back in (13). Crucially, the RPP proposal makes different predictions from the PerspP proposal under three conditions.

These differences, grounded in the requirements of each proposal, are illustrated in (22) and discussed in more detail in the following section.

	CP		SAP		PerspP		RPP	
	QS	NQS	QS	NQS	QS	NQS	QS	NQS
(21) ‘I...’	1	1	1	0	1	0	1	0
‘You...’	1	1	0	1	1	0	0	0
‘Xiaohong...’	1	1	1	1	1	0	1	0
‘Do I...?’	0	0	0	0	0	0	0	0
‘Do you...?’	1	1	0	0	0	1	1	1
‘Does Xiaohong...?’	1	1	1	1	0	1	1	1

	<i>I</i> (14)	<i>R</i> (15)	<i>K</i> (16)	PerspP: $I \wedge R$	RPP: $I \wedge K$
(22) ‘You wonder...’	✓	✓	✗	1	0
‘Do you wonder...?’	✓	✗	✓	0	1
‘Does Xiaohong wonder...?’	✓	✗	✓	0	1

4. Results and discussion

The survey was conducted with the approval of the Yale University Institutional Review Board. 12 native speakers of Beijing Mandarin participated. Each participant received \$15 upon completing the survey. The mean acceptability rates, calculated as the mean of all participants’ item-wise averages, along with the standard deviations of those participant-level averages, are presented in (23), where means higher than 50% are in bold.

	μ		σ	
	QS	NQS	QS	NQS
(23) ‘I...’	.83	.02	.31	.07
‘You...’	.21	.35	.21	.45
‘Xiaohong...’	.73	.15	.34	.20
‘Do I...?’	.06	.23	.16	.36
‘Do you...?’	.75	.77	.30	.34
‘Does Xiaohong...?’	.67	.63	.34	.38

A significant three-way interaction between matrix predicate type, subject person, and illocutionary force was established by fitting a mixed-effects logistic regression model and comparing it to three baseline models containing only two-way interactions, using χ^2 tests ($p < .001$).³ All models were fit using a binominal distribution and a logit link function and

³R Core Team. 2025. *R: A Language and Environment for Statistical Computing*. Vienna: R Foundation for Statistical Computing.

included random intercepts for items and subjects. More conservative models including by-subject random slopes for fixed factors failed to converge.

Separate mixed-effects logistic regression models were fit to declaratives and interrogatives, each including fixed effects for predicate type and subject person, along with random intercepts for items and subjects. In declaratives, predicate type exhibited a significant main effect on acceptability: QS predicates were rated as more acceptable than NQS ($\beta = 1.98$, $p < .001$). Subject person had a marginally significant effect: 2nd person was rated lower than 1st person, while 3rd person did not differ significantly from 1st person. Releveling the factor to use 2nd person as the reference showed that 3rd person was also rated significantly higher than 2nd person. The coefficients and p -values are reported in (24).

(24) *Declaratives*

Reference	Person	β	p
1	2	-.79	.02*
1	3	.05	.87
2	3	.84	.01*

In interrogatives, predicate type did not significantly affect the acceptability rates ($\beta = -.27$, $p = .33$). However, subject person had an effect: both 2nd and 3rd persons exhibited significantly higher acceptability than 1st person, and there was no significant difference between 2nd and 3rd persons. The coefficients and p -values are reported in (25).

(25) *Interrogatives*

Reference	Person	β	p
1	2	2.93	< .001***
1	3	2.38	< .001***
2	3	-.56	.08

To further elucidate the distinction between 2nd person and the other persons, a model was fit to QS declaratives including a fixed effect of matrix subject person and the same random intercepts mentioned before. Both 1st and 3rd persons were rated significantly higher than 2nd person, while no significant difference was found between 1st and 3rd persons. The coefficients and p -values are reported in (26). Another model was fit to 2nd-person declaratives with a fixed effect of predicate type, and no significant effect was observed ($\beta = -.73$, $p = .12$).

(26) *QS declaratives*

Reference	Person	β	p
1	2	-2.94	< .001***
1	3	-.62	.22
2	3	2.33	< .001***

This series of statistical analyses confirms a significant contrast between the bolded and nonbolded cells in (23). With this established, the results are observed to align most closely with the newly proposed RPP account, whose prediction is reproduced in (27).

(27)

Force	Person	Paraphrase	QS (‘wonder’)	NQS (‘know’)
DECL	1	‘I ...’	1	0
DECL	2	‘You ...’	0	0
DECL	3	‘Xiaohong ...’	1	0
Q	1	‘Do I ...?’	0	0
Q	2	‘Do you ...?’	1	1
Q	3	‘Does Xiaohong ...?’	1	1

The ignorance and knowledge requirements posited by the RPP proposal offer a compelling explanation for the observed distribution. NQS declaratives are ruled out by the ignorance requirement: the embedded question cannot be p-active for the subject if the subject already knows the answer. The QS–2–DECL condition (‘You wonder ...’) is ruled out by the knowledge requirement: it assumes the possibility of the addressee knowing the answer, a possibility that is incompatible with the addressee wondering about the embedded question. 1st-person interrogatives are unacceptable due to the oddity of querying one’s own knowledge or desire, a constraint shared by all competing proposals. All other conditions satisfy both requirements and are therefore acceptable.

To further demonstrate how the requirements posited by the RPP proposal best explain the observed distribution, (28) presents a comprehensive by-condition requirement satisfaction chart, expanding on the format of (22) and including predictions for both the PerspP and RPP proposals. 1-Q conditions (‘Do I ...?’) are excluded, as the constraint against querying one’s own knowledge or desires is independent and does not distinguish between the two proposals. Conditions where the proposals differ are highlighted in bold.

(28)

	<i>I</i> (14)	<i>R</i> (15)	<i>K</i> (16)	PerspP: <i>I</i> ∧ <i>R</i>	RPP: <i>I</i> ∧ <i>K</i>
‘I wonder ...’	✓	✓	✓	1	1
‘I know ...’	✗	✓	✓	0	0
‘You wonder ...’	✓	✓	✗	1	0
‘You know ...’	✗	✓	✓	0	0
‘Xiaohong wonders ...’	✓	✓	✓	1	1
‘Xiaohong knows ...’	✗	✓	✓	0	0
‘Do you wonder ...?’	✓	✗	✓	0	1
‘Do you know ...?’	✓	✓	✓	1	1
‘Does Xiaohong wonder ...?’	✓	✗	✓	0	1
‘Does Xiaohong know ...?’	✓	✓	✓	1	1

5. Conclusion

This paper has examined the embeddability patterns of Mandarin yes-no question marker *ma* across different matrix predicate types, subject persons, and illocutionary forces. To account for the distribution of embedded *ma*, I offer a revised PerspP proposal based on Dayal's (2023) *ignorance* requirement and the newly generalized *knowledge* requirement. Empirical results from a novel semantic judgment elicitation paradigm favor this new proposal over competing analyses.

Taken together, the findings substantiate two core empirical generalizations about *ma*: first, it is embeddable; and second, its embeddability is sensitive to the epistemic states of the speaker and the addressee in a way not previously documented. Future research can extend this work by testing RPP predictions across additional predicates and in other languages, as well as by exploring the potential role of contextual manipulation in overriding default perspectival constraints.

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