Intervention effects in Mandarin Chinese

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Summary
Intervention effects (IE, for short) refer to the phenomenon where an interrogative *wh*-expression cannot follow a quantifier or a focus expression. IEs are commonly found in *wh*-in-situ languages because it is more likely for in-situ *wh*-expressions to follow quantifiers or focus expressions. Since *wh*-in-situ in Mandarin Chinese (Mandarin, for short) has been subject to extensive research, it has played an important role in providing the empirical foundation for the research on IEs, based on which different approaches have been pursued. These approaches debate whether the nature of IEs is syntactic, semantic, or pragmatic. They also shed light on related linguistic issues, such as locality conditions, interactions of focus and *wh*-expressions, and information structure. The present article surveys the empirical and theoretical landscape of IEs in Mandarin, with the goals of providing references and directions for future research.

Keywords Intervention effects · Quantifiers · Focus · Questions · Mandarin

1 Introduction

Across languages it has been observed that some expressions are banned to precede an interrogative *wh*-expression. These expressions roughly fall into two categories—quantifiers and focus expressions. Since these expressions are considered as intervening in the formation of a *wh*-question, the phenomenon is referred to as 'intervention effects' (IEs, for short). IEs were first reported in Hoji (1985) based on Japanese and have been found in a wide range of languages since then, including Korean, German, Mandarin, Japanese, English, Turkish, and so on. Since IEs can only be observed when *wh*-expressions are preceded by interveners, they are much easier to observe in *wh*-in-situ languages, where *wh*-expressions can normally be preceded by other elements. *Wh*-in-situ in Mandarin has been subject to extensive research, so it plays an important role in establishing the empirical picture of IEs.[1] For example, the basic pattern of IEs can be illustrated with Mandarin sentences shown in (1) and (2), where the quantificational and focus subjects cannot precede the *wh*-objects.[2] However, once the *wh*-objects are fronted, the sentences become acceptable. Throughout the article, quantificational determiners like *méiyǒu* 'no' and focus-sensitive particle like *zhǐyǒu* 'only' are set in bold face, focus expressions, i.e., accent-bearing expressions associating with focus-sensitive particles, capitalized, and *wh*-expressions underlined.

(1) a. ??**Méi-yǒu** rén dú-guò ná-běn shū?
not-have person read-PERF which-CL book
b. Ná-běn shū **méi-yǒu** rén dú-guò?
which-CL book not-have person read-PERF
'Which book has no one read?'

(2) a. ***Zhǐyǒu** LǏBÁI dú-guò ná-běn shū?
only Libai read-PERF which-CL book
b. Ná-běn shū **zhǐyǒu** LǏBÁI dú-guò?
which-CL book only Libai read-PERF
'Which book has only LIBAI read?'

Given the empirical foundation established based on cross-linguistic data, various approaches have been advanced to account for IEs, spanning across syntax, semantics, and pragmatics. These approaches often interact with and inform research on locality conditions, questions, focus, and information structure. Among previous studies, research based on Mandarin brings important contributions as well as challenges:

1. IEs induced by quantifiers (QIE, for short) in Mandarin exhibit a different pattern from other languages. This confirms the cross-linguistic diversity of QIEs, which indicates that QIEs in different languages may have different resources.
2. IEs induced by focus (FIE, for short) in Mandarin show that it is focus expressions that trigger FIEs, not focus-related operators. This calls for a refinement of the general FIE configuration.
3. Recent experimental research on IEs in Mandarin clarifies the degraded status of IE sen-

tences in quantitative terms and shows that IEs are still present even when a focus intervener is contexually given.

This paper overviews the research on IEs in Mandarin, with the goal of providing an empirical generalization of IEs in Mandarin and a critical review of the existing analyses. It is organized as follows. Section 2 summarizes the empirical findings about IEs and clarify what count as interveners in Mandarin. Section 3 reviews syntactic, semantic, and pragmatic approaches to IEs, sketching various proposals in each approach, identifying the connections among them, and pointing out issues. Section 4 concludes and highlights potential directions of future research.

2 What are interveners

The most important question in the research on IEs concerns identifying the lexical items that trigger IEs. At first glance, interveners in Mandarin may be quantificational or focus-related. However, the actual situation is far more complex. Through a decade of research, it is concluded that (a) not all quantificational or focus-related expressions trigger IEs; (b) interveners are not the same for *wh*-nominal and *wh*-adverbial questions. Section 2.1 provides a brief introduction to *wh*-questions in Mandarin. Section 2.2 and 2.3 establish the generalizations about quantifier and focus interveners based on previous studies. Finally, Section 2.4 clarifies special properties relating to IEs in *wh*-adverbial questions.

2.1 Mandarin *wh*-questions

In order to facilitate the following discussion, this section first sketches the basic features of Mandarin *wh*-questions. Mandarin is a typical *wh*-in-situ language, i.e. *wh*-expressions do not undergo movement but stay in their base-generated positions. Based on syntactic categories, *wh*-expressions can be distinguished based on whether they are *wh*-nominals or *wh*-adverbials. *Wh*-nominals like *shéi* 'who', *shénme* 'what', *nǎr* 'where', and *nǎ* 'which' are used as arguments of verbs or prepositions, resembling the distribution of typical nominal expressions. *Wh*-adverbials modify verb phrases or sentences. In particular, Tsai (2008) argues that *wèi-(le) shénme* 'for what' and *zěnyàng* 'how' are modifiers of verb phrases, whereas *wèishénme* 'why' and *zěnme* 'how come' modifiers of sentences. As a consequence, the first two *wh*-adverbials are structurally lower than the latter two *wh*-adverbials. The height distinction is evidenced by the fact that the first two *wh*-adverbials must follow modals like *hùi* 'can' but the second two *wh*-adverbials must precede those modals, as exemplified in (3) and (4).

(3) a. Lǐbái {zěnme / wèshénme} huì xiū chē?
Libai how.come why can fix car

b. *Lǐbái huì xiū {zěnme / wèshénme} chē?
Libai can fix how.come why car
'How come Libai can fix cars? / Why can Libai fix cars?'

(4) a. *Lǐbái {wèi-(le) shénme / zěnyàng} huì xiū chē?
Libai for-PERF what how can fix car

b. Lǐbái huì {wèi-(le) shénme / zěnyàng} xiū chē?
Libai can for-PERF what how fix car
'For what can Libai fix cars? / How can Libai fix cars?'

In this sense, *wèi-(le) shénme* and *zěnyàng* are called 'high *wh*-adverbials', while *wèishénme* and *zěnme* 'low *wh*-adverbials'. The following sections will show that IEs exhibit different patterns among questions with *wh*-nominals, high and low *wh*-adverbials.

2.2 Quantifier interveners

Since the 1980s, quantifiers have been recognized to trigger IEs in *wh*-questions across many languages including Japanese, German, Korean, and English. However, quantifier interveners do not constituent a homogeneous class cross-linguistically. In other words, what counts as an intervener in a language may very well be a non-intervener in another language. As for Mandarin, both Soh (2005) and Yang (2008, 2012) argue that quantifiers are not interveners in *wh*-nominal questions, but in *wh*-adverbial questions. However, Li and Law (2016) and Xue (2016) observe that, in Mandarin, the 'weak–strong' distinction among quantifiers is the key factor in identifying quantifier interveners. Specifically, Milsark (1974) notices that quantifiers can be divided into two groups—strong and weak quantifiers. Empirically, only weak quantifiers can appear in existential constructions (Milsark 1974), as shown below. In order to align with the length requirement, curly brackets are useed to group identical types of lexical items. The choice of a lexical item within a curly bracket does not affect the acceptance rate of the whole sentence.

(5) a. Weak quantifiers

Yǒu	yí-gè one-CL	xuéshēng	zài	jiàoshì.
have	yí-xiē one-CL	student	at	classroom
	sān-gè three-CL			

'There is/are a/some/three student(s) in the classroom.'

b. Strong quantifiers

*Yǒu	měi-gè every-CL	xuéshēng	zài	jiàoshì.
have	dàduōshù most	student	at	classroom

Intended 'Every/most student(s) is/are in the classroom.'

Theoretically, Barwise and Cooper (1981) identify the formal property that can tease apart these

two types of quantifiers. The formal details will not be spelled out here. Interested readers can read Barwise & Cooper's paper.

In Mandarin, weak quantifiers can evoke IEs in *wh*-nominal questions, as illustrated by (6), rather than strong quantifiers, as illustrated by (7).

(6) a. ??{ (**Zhìshǎo/Zuìduō**) **yǒu yí-gè** / at.least/at.most have one-CL ; (**Zhìshǎo/Zuìduō**) **yǒu yí-xiē** / at.least/at.most have one-PLC ; **Méi-yǒu** (**rènhé**) / not-have any } xuēshēng dú-guò nǎ-běn shū? / student read-PERF which-CL book

b. Ná-běn shū { (**zhìshǎo/zuìduō**) **yǒu yí-gè** / at.least/at.most have one-CL ; (**zhìshǎo/zuìduō**) **yǒu yí-xiē** / at.least/at.most have one-PLC ; **méi-yǒu** (**rènhé**) / not-have any } xuēshēng dú-guò? / which-CL book student read-PERF

'What is the book read by (at least/at most) a student / some students / no student?'

(7) { **Měi-gè** / every-CL ; **Dàduōshù** / most } xuéshēng dōu dú-le ná-běn shū / student all read-PERF which-CL book

'Which novel did every student / most students read?'

The pattern of QIEs in *wh*-adverbial questions is basically the same as that in *wh*-nominal questions. That is, weak quantifiers, rather than strong quantifiers, also leads to IEs when preceding *wh*-adverbials, as shown from (8) through (11).

High *wh*-adverbial questions

(8) a. ??{ **Yǒu yí-gè** xuéshēng / have one-CL student ; **Yǒu yì-xiē** xuéshēng / have one-PLC student ; **Méi-yǒu** xuēshēng / not-have student } zěnme/wèishénme bù lái? / how.come/why not come

b. Zěnme/Wèishénme how.come/why { **yǒu yí-gè** xuéshēng have one-CL student / **yǒu yì-xiē** xuéshēng have one-PLC student / **méi-yǒu** xuēshēng not-have student } bù lái? not come

(i) 'How come a student/some students/no student didn't come?'
(ii) 'Why did a student/some students/no student not come?'

(9) { **Měi-gè** xuéshēng every-CL student / **Dàduōshù** xuéshēng most student } zěnme/wèishénme dōu bù lái? how.come/why all not come

a. 'How come every student/most students didn't come?'
b. 'Why did every student/most students not come?'

Low *wh*-adverbial questions

(10) a. ?? { **Yǒu yí-gè** xuéshēng have one-CL student / **Yǒu yì-xiē** xuéshēng have one-PLC student / **Méi-yǒu** xuēshēng not-have student } huì zěnyàng/wèi(-le) shénme qù Běijīng? will how/for.what go Beijing

b. Rénmen huì zěnyàng/wèi(-le) shénme qù mài **yí-tào fáng**?
people will how/for.what go buy one-CL apartment
'How/for what will people buy an apartment?'

(11) { **Měi-gè** xuéshēng every-CL student / **Dàduōshù** xuéshēng most student } dōu huì zěnyàng/wèi(-le) shénme mǎi fáng? all will how/for.what buy apartment

'How/For what will every student / most students buy an apartment?'

2.3 Focus interveners

Unlike quantifiers, various focus expressions are consistent intervention triggers across languages. The consistency can clearly be demonstrated with Mandarin data. From (12) through (14), the focus expressions associate with a focus-sensitive particle like *zhǐ* 'only', *zhǐyǒu* 'only', an affirmative particle *shì*, *hái* 'also', and *lián ... dōu* 'even'. These focus-sensitive particles have their own meanings and mark different types of foci. Briefly, the focus expressions associating with *zhǐ*, *zhǐyǒu*, and *shì* are interpreted exhaustively, while the focus expressions associating with *lián ... dōu* and *hái* are interpreted additively. The exhaustive and additive interpretations are demonstrated through the inferences of the following examples. These observations challenge Xie's (2013) generalization that only exhaustive focus is counted as an intervener.[3]

(12) a. * { **Zhǐyǒu** only / **Shì** AFFIR } LǏBÁI dú-le ná-běn shū?
Libai read-PERF which-CL book

b. Ná-běn shū { **zhǐyǒu** only / **shì** AFFIR } LǏBÁI dú-le?
which-CL book Libai read-PERF

'What is the book x such that only LIBAI read x / it is LIBAI who read x?'
Inference ⇝ There is a book that no one but Libai read.

(13) a. *Tā **zhǐ** yāoqǐng-le LǏBÁI cānjiā nǎ-cháng huódòng?
he only invite-PERF Libai attend which-CL activity

b. Nǎ-chǎng huódòng tā **zhǐ** yāoqǐng-le LǏBÁI cānjiā ?
which-CL activity he only invite-PERF Libai attend
'What is the activity x such that he only invited LIBAI to attend x?'
Inference ⇝ There is an activity that no one but Libai was invited to attend.

(14) a. ***Lián** LǏBÁI **dōu** dú-guò ná-běn shū?
even Libai all read-PERF which-CL book

b. Ná-běn shū **lián** LǏBÁI **dōu** dú-guò?
which-CL book even Libai all read-PERF
'What is the book x such that even LIBAI read x?'
Inference ⇝ There is a book that someone besides Libai read.

(15) a. *Lǐbái bùjǐn zài zǎoshàng **hái** zài WǍNSHÀNG chī nǎ-zhǒng shǔiguǒ?
Libai not.only at morning also at evening eat which-CL fruit

b. Nǎ-zhǒng shǔiguǒ Lǐbái bùjǐn zài zǎoshàng **hái** zài WǍNSHÀNG chī?
which-CL fruit Libai not.only at morning also at evening eat
'Which kind of fruit is the one that Libai eats not only in the morning but also in the EVENING?'

Inference $\rightsquigarrow$ There is a kind of fruit that Libai eats at a time besides in the evening.

The same focus expressions also induce IEs in *wh*-adverbial questions, as shown below.

High *wh*-adverbial questions

(16) a. *__Zhǐyǒu__ LǏBÁI zěnme/wèishénme bù lái?
only Libai how.come/why not come
b. Zěnme/Wèishénme __zhǐyǒu__ LǏBÁI bù lái?
how.come/why only Libai not come
(i) 'How come only LIBAI didn't come?'
(ii) 'Why did only LIBAI not come?'

(17) a. *__Shì__ LǏBÁI zěnme/wèishénme qù Béijīng?
AFFIR Libai how.come/why go Beijing
b. Zěnme/Wèishénme __shì__ LǏBÁI bù lái?
how.come/why AFFIR Libai go Beijing
(i) 'How come it is LIBAI who went to Beijing'
(ii) 'Why is it LIBAI who went to Beijing?'

(18) a. *Lǐbái __zhǐ__ gěi DÙFǓ zěnme/wèishénme sòng lǐwù?
Libai only to Dufu how.come/why send gift
b. Lǐbái zěnme/wèishénme __zhǐ__ gěi DÙFǓ sòng lǐwù?
Libai how.come/why only to Dufu send gift
(i) 'How come Libai only sent DUFU a gift?'
(ii) 'Why did Libai only send DUFU a gift?'

(19) a. *__Lián__ LǏBÁI dōu zěnme/wèishénme bù lái?
even Libai all how.come/why not come
b. Zěnme/Wèishénme __lián__ LǏBÁI dōu bù lái?
how.come/why even Libai all not come
(i) 'How come even LIBAI didn't come?'
(ii) 'Why did even LIBAI not come?'

Low *wh*-adverbial questions

(20) a. *Lǐbái __zhǐ__ zài JIĀ zěnyàng xiū-de chē?
Libai only at home how fix-PERF car
Intended 'What is the manner x such that Libai fixed the car only at HOME with x?'
b. Lǐbái zěnyàng __zhǐ__ xiū YÌ-mén kè jiù ná-dào-le zhèngshū?
Libai how only enroll one-CL course just take-arrive-PERF certificate
'In what way did Libai obtain the certificate by only taking ONE course?'

(21) a. *Lǐbái __hái__ zài JIĀ zěnyàng xiū-de chē?
Libai also at home how fix-PERF car
Intended 'What is the manner x such that Libai also fixed a car at HOME with x?'

b. Lǐbái zěnyàng **hái** zài YUÀNZI lǐ jiàn-le yí-gè chǔcángshì?
Libai how also at yard inside build-PERF one-CL storage
'In what way did Libai also built a storage room in the YARD?'

(22) a. *Lǐbái **zhǐ** zài BĚIJĪNG wèi-le shénme xué wàiyǔ?
Libai only at Beijing for-PERF what learn foreign.language
Intended 'For what did Libai learn a foreign language only in Beijing?'
b. Lǐbái wèi-le shénme **zhǐ** zài ZHÈ-jiā cāntīng chī fàn?
Libai for-PERF what only at this-CL restaurant eat meal
'For what did Libai only eat in THIS restaurant?'

(23) a. *Lǐbái **hái** zài BĚIJĪNG wèi-le shénme xué wàiyǔ?
Libai also at Beijing for-PERF what learn foreign.language
Intended 'For what did Libai also learn a foreign language in BEIJING?'
b. Lǐbái wèi-le shénme **hái** gěi DÙFǓ sòng-le lǐwù?
Libai for-PERF what also to Dufu send-PERF gift
'For what did Libai also send DUFU a gift?'

Although focus interveners seem to be largely homogeneous, there is still the question of what exactly intervenes in FIEs. From (12) through (15), the focus expressions are marked via being associated with a focus-sensitive particle. Based on Rooth (1985, 1992), the interaction between a focus-sensitive particle and its associate is interpreted via a focus interpretation operator $\sim$, which is classically considered the focus intervener (Beck 2006; Beck and Kim 2006; Trukenbrodt 2013; Kotek 2014; Kotek and Erlewine 2016; a.o.). Briefly, $\sim$ imposes a condition on the usage of focus expressions. This paper will not delve into the detailed definition of $\sim$. Interested readers can refer to Rooth (1992). Consequently, once association is formulated in a *wh*-expression, the $\sim$ operator must appear and be able to trigger FIEs.

This prediction is challenged in Mandarin. Specifically, in a *wh*-question, a focus-sensitive particle can be associated with the *wh*-expression when no other expression bears focus, as pointed out by Aoun and Li (1993), Shi (1994a), and Li and Law (2016). Consider the following sentences. For each example, association between the focus-sensitive particle and the *wh*-expression is evidenced by the answerhood, where the meaning contribution of the focus-sensitive particle is perceived. For the convenience of discussion, association between focus-sensitive particles and *wh*-expressions is referred to as 'Foc-WH association'.

(24) Libai **zhǐ** zài nǎ-er zhù-guò liǎng nián?
Libai only at where live-PERF two year
'What is the place x such that Libai lived two years only at x?'
Answerhood $\rightsquigarrow$ Provide the *unique* place where Libai lived for two years.

(25) Zhè-cì kāhuì **zhǐyǒu** shéi méi lái?
this-CL meeting only who not come
'Who is the person x such that only x didn't attend the meeting.'
Answerhood $\rightsquigarrow$ Provide the *unique* person who didn't attend the meeting.

(26) **Shǐ** shéi chídào le?
AFFIR who late PERF
'Who is the person x such that it was x who was late?'
Answerhood $\rightsquigarrow$ Provide the *unique* person who was late.

(27) Lǐbái **hái** mǎi-le shénme?
Libai also buy-PERF what
'What is the thing x such that Libai bought x besides something else?'
Answerhood $\rightsquigarrow$ Provide the thing that Libai bought along with *something else*.

Since an association is formed in each example, the $\sim$ operator is expected to occur. If it were an intervener, these examples should be ruled out by FIEs, contrary to fact. Thus, the $\sim$ operator cannot be a focus intervener.

Given FIE patterns and Foc-WH association, Li and Law (2016) conclude that focus interveners are focus expressions associating with focus-sensitive particles. Besides Mandarin, this conclusion can also be reached based on English and Turkish (Demirok 2019).

2.4 Special properties of *wh*-adverbial questions

Examining IEs closely also reveals some special properties of IEs in *wh*-adverbial questions (Soh 2005; Yang 2008, 2012; Li and Cheung 2012; Xue 2016; a.o.). This section shows that these properties are connected to the syntactic positions of *wh*-adverbials. First, Tsai (2008) points out that a strong quantifier may induce IEs in a high *wh*-adverbial question when the *wh*-adverbial follows the adverb *dōu* 'all', as shown in (28). An interesting contrast is that the low *wh*-adverbials cannot precede *dōu*, as shown in (29).

(28)

* {**Měi-gè** every-CL / **Dàduōshù** most}	xuéshēng	dōu	zěnme/wèishénme	bù	lái?	
	student	all	how.come/why	not	come	

(29)

* {**Měi-gè** every-CL / **Dàduōshù** most}	xuéshēng	zěnyàng/wèi(-le) shénme	dōu	huì	mǎi	fáng?	
	student	how/for-PERF what	all	will	buy	apartment	

Based on previous studies, this contrast may be related to the positions of high and low *wh*-adverbials (see Section 2.1). Assuming that *dōu* is an adverb marking the edge of a verb phrase, the unacceptability of (28) and (29) are expected: the high *wh*-adverbials located higher than verb phrases must precede *dōu*, whereas the low *wh*-adverbials placed within verb phrases must follow *dōu*. In (28), the strong quantifiers preceding the high *wh*-adverbials are proposed to undergo topicalization (Tsai 2008; see also Ko 2005), which is also crucial to a semantic account for QIEs in the high *wh*-adverbial questions (Jin 2020). This issue will be revisited in section 3.2.2.

Second, it seems that focus-sensitive particles trigger IEs in high *wh*-adverbial questions, as illustrated in (30). On the other hand, these examples show that focus-sensitive particles cannot take the high *wh*-adverbials as associates.[4]

(30) a. ***Shì*** wèishénme/zěnme Lǐbái bú qù?
AFFIR why/how.come Libai not go
Intended 'What is the reason x such that it is because of x that Libai won't go?'
b. *Lǐbái **zhǐ** wèishénme/zěnme bú qù?
Libai only why/how.come not go
Intended 'What is the reason x such that Libai won't go only because of x?'

Low *wh*-adverbials also behave differently from high *wh*-adverbials in terms of association with focus-sensitive particles. For example, in (31), the low *wh*-adverbials associate with the focus-sensitive particles, and hence no IEs are observed.

(31) a. Lǐbái **shì** wèi-le shénme/zěnyàng qù-de Běijīng?
Libai AFFIR for-PERF.what/how go-PERF Beijing
'{What is the thing x / What is the way y} such that it is {for x / by y} that Libai went to Beijing?'
b. Lǐbái **zhǐ** huì wèi-le shénme/zěnyàng xiū chē?
Libai only will for-PERF.what/how fix car
'{What is the thing x / What is the way y} such that Libai will fix the car {for x / by y}?'

According to Li and Cheung (2012), the contrast shown in the above two sets of sentences is also caused by the positional difference between high and low *wh*-adverbials. Basically, as discussed in Li and Cheung (2012), Mandarin focus-sensitive particles cannot adjoin to a position lower than CP (see also Tsai 2015). However, high *wh*-adverbials occupy a high position in the CP domain. As a result, they must be higher than focus-sensitive particles and the word order shown in the sentences in (30) is disallowed. Thus, in (30), the focus-sensitive particles do not intervene between the *wh*-adverbials and other operators but their adjunction sites are too high.

In short, IEs in high *wh*-adverbial questions exhibit distinct properties from other kinds of *wh*-questions, including low *wh*-adverbial questions. Crucially, high *wh*-adverbials are positioned higher than quantifier or focus interveners, so they are not supposed to be intervened. As a consequence, IEs observed in high *wh*-adverbial questions have a different cause than those observed in other *wh*-questions.

2.5 Interim summary

Based on the previous discussion, QIEs and FIEs in Mandarin exhibit uniform patterns in *wh*-questions, except the ones with high *wh*-adverbials, where both kinds of IEs are triggered in a different way. The patterns are summarized as follows.

- QIEs appear only when a **weak quantifier** precedes a *wh*-expression.

- FIEs appear only when a **focus expression** (not just a focus-sensitive particle) precedes a *wh*-expression.

As discussed in Section 2.4, IEs in high *wh*-adverbials are attributed to the incorrect positioning of high *wh*-adverbials. By contrast, IEs in other kinds of *wh*-questions appear because of the interaction between a *wh*-expression and an intervener within a local domain. Different approaches have been developed for understanding the nature of the interaction. Section 3 takes up those approaches in more detail.

3 Approaches to IEs in Mandarin

3.1 Syntactic approaches

Syntactic approaches to IEs typically adopt one of two competing assumptions about how in-situ *wh*-expressions receive a question interpretation. The first one advocates a covert movement analysis (Huang 1982; Lasnik and Saito 1984; Pesetsky 2000; Li and Shi 2022; a.o.). According to this approach, in-situ *wh*-expressions have to move to a sentence initial position just like overtly fronted *wh*-expressions, but this movement happens at a syntactic level without a connection to the phonological representation. Therefore, the movement of in-situ *wh*-expressions is inaudible. The second one argues for a truly in-situ analysis (Cheng 1991; Aoun and Li 1993; Shi 1994b; Tsai 1994a; a.o.). On this view, in-situ *wh*-expressions do not undergo covert movement but form a dependency with a question operator $\mathbb{Q}$ in the sentence initial position. This dependency is established via a syntactic operation like syntactic binding or feature agreement. Based on these two views, IEs are usually analyzed as failure of covert movement or failure in forming a dependency.

3.1.1 The Blocking approach

In the blocking approach, IEs are assumed to reflect the blocking of a syntactic operation. Although the analyses under this approach identify this syntactic operation differently, they uniformly argue that interveners interfere with this operation, leading to unacceptability.

While it focuses on the syntax of *wh*-in-situ, Soh (2005) offers the first account for IEs in Mandarin. Following Pesetsky (2000), she argues that IEs result from the blocking of feature movement.[5] Specifically, Pesetsky assumes that a *wh*-expression can be decomposed into a question feature and a nominal expression. For example, *shénme* 'what' consists of a question feature Q and a nominal expression akin to *thing* in English. At the level of semantic representation, the Q feature is interpreted as an operator, while the nominal expression serves as its restriction. According to Pesetsky, an operator cannot be separated from its restriction by another scope-bearing element, such as a quantifier. Building on these assumptions, Soh proposes that in Mandarin *wh*-adverbials undergo feature movement but *wh*-nominals covert phrase movement. In (32), the question feature Q that the *wh*-adverbial *zěnyàng* bears moves to the sentence initial position, but the Q feature is seperated from its restriction by the intervening quantifier, as visualized in (33). As a result, (33) is ruled out as an ill-formed representation.

(32) *__Méi-yǒu__ rén zěnyàng xiū-de chē?
no-have person how fix-PERF car
Intended 'What is the way x such that no one fixed cars with x?'

(33) [$_{CP}$ $\mathbb{Q}_1$ ... [$_{IP}$ no one ... [t_1 way]] ...]
intervener

By contrast, a *wh*-nominal like *shénme* 'what', which undergoes covert phrasal movement rather than feature movement, is not affected by a quantifier, as shown in (34). In this case, the question feature and its restriction always move together and nothing could intervene between them. Consequently, no IE is expected to appear in a *wh*-nominal question, as evidenced by (34).

(34) __Měi-gè__ rén dōu mǎi-le shénme?
every-CL person all buy-PERF what
'What did everyone buy?'

This account suffers from both theoretical and empirical problems. Theoretically, this account is viable only when in-situ *wh*-expressions necessarily undergo movement. However, the movement analysis of in-situ *wh*-expressions has been challenged since the 1990s and a number of mechanisms for interpreting a *wh*-expression without movement have been proposed (Cheng 1991; Li 1992; Aoun and Li 1993; Shi 1994b; Tsai 1994a, a.o.). Empirically, this account is not based on a full picture of IEs in Mandarin. Section 2.2 has shown that weak quantifiers are interveners in both *wh*-nominal and *wh*-adverbial questions. This fact does not support the distinction between *wh*-nominals and *wh*-adverbials proposed by Soh. In addition, this account does not predict that focus expressions uniformly trigger IEs when occurring before both kinds of *wh*-expressions, as demonstrated in Section 2.3.

As a response to the challenges to Soh's account, Yang (2008, 2012) limits the application of the blocking approach to *wh*-adverbial questions. Following Tsai (1994a,b), he assumes that *wh*-nominals are truly in situ but *wh*-adverbials are not. In particular, the former denote free variables and are bound by a question operator in the CP domain, whereas the latter involve a question operator and must undergo covert movement to CP. Based on this distinction, Yang proposes that (a) quantifiers and focus expressions block the covert movement of *wh*-adverbials, inducing IEs; (b) quantifiers do not trigger IEs in *wh*-nominal questions, because there is no covert movement; (c) FIEs result from a syntactic competition, which will be returned to in Section 3.1.2. However, Yang's blocking analysis does not explain why weak quantifiers lead to IEs in *wh*-nominal questions.

Turning to the Minimalist Program, Li and Cheung (2012, 2015) follow Kim (2006) and explain FIEs with the help of the locality condition of Agree, which is a syntactic operation forming dependencies between lexical items (Chomsky 1995, 2000). According to the theory of Agree, an in-situ *wh*-question involves feature agreement between the *wh*-expression and a covert question operator $\mathbb{Q}$. Specifically, an in-situ *wh*-expression has a question feature $\mathbb{Q}$ that needs to be checked with the same kind of feature borne by $\mathbb{Q}$ via Agree. As a consequence, an in-situ *wh*-expression does not undergo covert movement. Moreover, based on the affinity of focus and *wh*-expressions (Horvath 1986; Haida 2007; Trukenbrodt 2013; Dong 2018; a.o.),

Li & Cheung posit a focus feature agreement between a *wh*-expression and Q in addition to the question feature agreement. These two agreements are depicted in (35).

(35) $[_{CP}\ Q_{F,Q} \ldots [_{IP} \ldots WH_{F,Q}\ ] \ldots\ ]$

Based on the Agree approach, a focus expression may interfere with the dependency between a *wh*-expression and Q. A focus expression also bears a focus feature. Therefore, when a focus expression XP occurs before a *wh*-expression, Q Agree-s with XP rather than the *wh*-expression. This is because XP is closer than Q. In other words, XP blocks the focus feature agreement between the *wh*-expression and Q. Consequently, the dependency between Q and the *wh*-expression cannot be established, as shown in (36).

(36) $[_{CP}\ Q_{F,Q} \ldots [_{IP}\ \text{Foc-P}_{F}\ [\ XP_{F} \ldots WH_{F,Q}\ ] \ldots\ ]\ ]$

In (36), Foc-P stands for a focus sensitive particle like *zhǐyǒu* 'only' or *zhǐ* 'only'. It also bears a focus feature, which needs to 'Agree' with a focus expression or a *wh*-expression. When there is no focus expression appearing in (36), the focus feature agreement is formed between Foc-P and the *wh*-expression, generating Foc-WH association, as visualized in (37).

(37) $[_{CP}\ Q_{F,Q} \ldots \text{Foc-P}_{F}\ [_{IP} \ldots WH_{F,Q}\ ] \ldots\ ]$

Li & Cheung's analysis heavely relies on the focus feature agreement. As a consequence, it can hardly be extended to QIEs, as quantifiers are not commonly assumed to bear a focus feature. To my knowledge, only Xue (2016) tries to classify weak quantifiers as inherent focus expressions. She argues that a weak quantifier rather than a strong quantifier can serve as the associate of a focus sensitive particle. However, this does not accord with the empirical data—as shown in (38), strong quantifiers can be associated with *shì*.[6]

(38) **Shì** MĚI-GÈ rén dōu yào dào, bú shǐ jiù nǐ-men jǐ-gè.
AFFIR every-CL person all must come not AFFIR just you-PLU several-CL
'It is EVERYONE who must come, not just you.'

3.1.2 The competition approach

Departing from the blocking approach, Yang (2008, 2012) propose that FIEs in *wh*-nominal questions are reduced to a syntactic competition between a question operator and a focus operator. In his analysis, a focus expression must be bound by a focus operator, while a *wh*-nominal

a question operator. He also assumes that the focus operator binding a focused subject is located in the same position as the question operator. Therefore, once a focused subject and a *wh*-nominal co-occur, the focus operator must compete with the question operator for the same syntactic position, resulting in unacceptability. The competition can be depicted as in (39).

(39) $[_{CP}$ $\overset{\mathbb{F}_1}{\overset{\vdots}{\overset{\Updownarrow}{\underset{\vdots}{\mathbb{Q}_2}}}}$ $[_{IP}$ [Focused subject]$_1$ ... WH_2]]

The competition approach predicts that FIEs in *wh*-nominal questions are weakened in embedding contexts, as illustrated in (40).

(40)

?Dùi-le	nǐ	rènwéi	**zhǐyǒu** only	LǏBÁI	chī-le	shěme?
by.the.way	you	think	**shì** AFFIR	Libai	eat-PERF	what

a. 'What do you think only LIBAI ate?'
b. 'What is the food such that you think it was LIBAI who ate it?'

The focused subject of the embedded clause is bound by the focus operator in the embedded CP, while the *wh*-expression is bound by the question operator located in the matrix CP. Therefore, they do not compete for the same syntactic position.

However, this analysis does not capture the fact that a focus expression at a non-subject position also triggers IEs, as demonstrated in (13) and (15). In addition, it seems that the judgments of FIEs in embedding contexts are controversial. Li (2011) reports that the weakening effect shown in (40) is not consistently replicated in his study. Given this situation, a controlled experiment is needed to yield a clearer contrast.

3.2 Semantic approaches

Under semantic approaches, IEs are considered as resulting from a compositional crash or a violation of a meaning requirement. An important consequence is that the explanation of IEs does not necessarily assume a dependency between the $\mathbb{Q}$ operator and a *wh*-expression. Therefore, a semantic account for IEs may be independent to the formation of interrogative constructions. This extends the impact of a theory of IEs beyond interrogative constructions.

3.2.1 The compositional approach

Honcoop (1998) initiated semantic research on IEs. In his analysis, interveners are items blocking discourse anaphora and IEs occur when an intervener interferes with the binding relation of a *wh*-expression and its variable. However, this analysis only explains why downward entailing quantifiers like *no*-NPs or *few*-NPs lead to QIEs, as these quantifiers are independently known to block discourse anaphora. Other types of interveners are left open. Currently, the

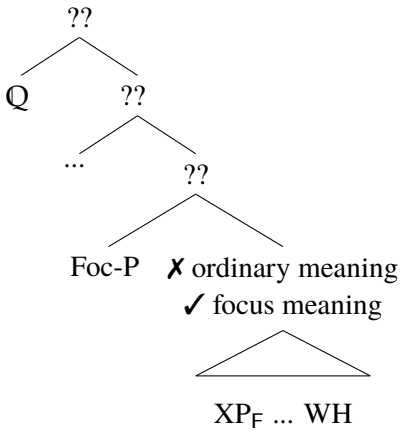
most prominent semantic approach is the one proposed by Beck (2006). It explains IEs based on the *compositional* interaction of focus and interrogative meanings. This spirit is also adopted in a lot of subsequent research. This section will review the main idea of this approach as well as discuss its consequences in the following subsections.[7]

3.2.1.1 Basis Building on Rooth (1985, 1992), Beck develops a focus semantics for *wh*-questions. Specifically, meaning is multi-dimensional. A lexical item α has not only an ordinary meaning but also a focus meaning. If α is focused, its focus value is a set of alternatives. For example, in (46), the ordinary meaning of *DÙFǓ* is a person whose name is Dufu, while its focus meaning is a set of people. The focus-sensitive particle *zhǐ* associates with the focus expression and makes use of both the ordinary meaning and the focus meaning, giving rise to the interpretation like 'Libai met Dufu but not anyone else in the set'.

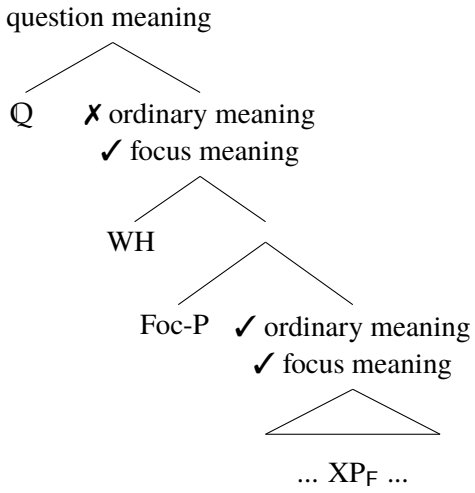
(41) Lǐbái zhǐ jiàn-le DÙFǓ.
Libai only meet-PERF Dufu
'Libai only met DUFU.' Inference ⇝ Libai didn't meet anyone else.

The key feature of Beck's analysis is that a *wh*-expression does not have an ordinary meaning but only a focus meaning—a set of alternatives. Due to the lack of the ordinary meaning, a *wh*-expression cannot be associated with a focus-sensitive particle or a general focus interpretation operator in the sense of Rooth (1992). Only the question operator Q can use the defective meaning contributed by a *wh*-expression. According to compositional semantics, the meaning of a constituent is determined by combining the meanings of its parts. Based on this framework, the FIE configuration shown in (42) does not have a well-formed meaning. The *wh*-constituent combining with Foc-P (i.e., focus-sensitive particle) does not have an ordinary meaning, because the *wh*-expression within the constituent does not, either. However, Foc-P requires its sister to have an ordinary meaning, so it cannot combine with the *wh*-constituent.

(42)



(43)



By contrast, if no *wh*-expression appears in the constituent combining with a focus-sensitive particle, as illustrated in (43), FIEs should not occur. In this case, the *wh*-constituent combines

with Q, which maps the focus meaning to a question meaning.

Beck's analysis not only aims to explain FIEs but also inspires subsequent research on various aspects of question meaning (Cable 2010; Kotek 2014; Kotek and Erlewine 2016; Dong 2018; Uegaki 2018; a.o.). Nevertheless, this analysis is challenged by two phenomena. The first one is Foc-WH association. Beck's analysis predicts that a focus-sensitive particle cannot combine with any *wh*-constituent. According to her assumption, a constituent only containing a *wh*-expression does not have an ordinary meaning, either. So, it should not be able to combine with a focus-sensitive particle. However, the fact is that the focus-sensitive particle successfully combines with the *wh*-constituent and takes the *wh*-expression as its associate. The second one is how to capture QIEs. Beck's analysis is built on focus semantics, so it straightforwardly accounts for FIEs. However, quantifiers are not focused in nature. Without additional assumptions, such a focus-based analysis cannot be extended to QIEs.

In order to offer accounts for both FIEs and Foc-WH association, Li and Law (2016) abandon the assumption that *wh*-expressions lack ordinary meaning. Instead, they argue that FIEs arise because a *wh*- and focus expression together create an untenable focus meaning. Maintaining the standard Hamblin semantics and the standard focus semantics, Li & Law assume that a focus expression evokes alternatives at the dimension of focus meaning, whereas a *wh*-expression at the dimension of ordinary meaning. Consider (44).

(44) **Zhǐyǒu** LǏBÁI dú-le nǎ-běn shū?
only Libai read-PERF which-CL book
Intended 'What is the book x such that only LIBAI read x?'

The ordinary meaning of the *wh*-constituent in the scope of *zhǐyǒu* is a set of sentential meanings like (45), which, briefly speaking, is generated via replacing the *wh*-expression with alternative books, such as *War & Peace* (WP) and *Mobby Dick* (MD). The corresponding focus meaning is a set of sets of sentential meanings, as shown in (46). These set members are generated through replacing the subject *Libai* with its focus alternatives like *Libai* and *Dufu*.

(45) Ordinary meaning

$$\left\{ \begin{array}{l} [\![\text{Libai read WP}]\!], \\ [\![\text{Libai read MD}]\!] \end{array} \right\}$$

(46) Focus meaning

$$\left\{ \left\{ \begin{array}{l} [\![\text{Libai read WP}]\!], \\ [\![\text{Libai read MD}]\!] \end{array} \right\}, \left\{ \begin{array}{l} [\![\text{Dufu read WP}]\!], \\ [\![\text{Dufu read MD}]\!] \end{array} \right\} \right\}$$

However, based on Roothian focus semantics (Rooth 1985, 1992; Beaver and Clark 2008; a.o.), a focus-sensitive particle cannot combine with a constituent with a higher order set like a set of sets of sentential meanings. Consequently, in (44), it is impossible to compose *zhǐyǒu* with the prejacent *wh*-constituent.

As for Foc-WH association, a *wh*-expression serves as the associate of a focus-sensitive particle. In this situation, the ordinary meaning of the *wh*-expression is a set including alternative focus expressions (Li and Shi 2022). For example, in (47), *shéi* contributes a set like

{⟦LIBAI⟧, ⟦DUFU⟧} at the dimension of ordinary meaning. Replacing the *wh*-expression with the focus expressions give rise to a set of sentential meanings in (48), which is the ordinary meaning of the *wh*-question in (47). In each member of the resultant set, the focus-sensitive particle is associated with the focus subject.[8]

(47) **Zhǐyǒu** shéi dú-guò zhè-běn shū.
only who read-PERF this-CL book
'Who is the person *x* such that only *x* read this book?'

(48) Ordinary meaning

$$\left\{ \begin{array}{l} \text{⟦only LIBAI read this book⟧,} \\ \text{⟦only DUFU read this book⟧} \end{array} \right\}$$

3.2.1.2 Generalized FIEs In addition to explaining FIEs and Foc-WH association, Li & Law's analysis predicts that the formation of interrogative constructions is not a necessary condition for FIEs. According this analysis, the ordinary alternatives introduced by a *wh*-expression and the focus alternatives introduced by a focus expression interact and give rise to a focus meaning that will eventually lead to composition failure. If this conclusion is on the right track, the FIE configuration can be represented in a more general way, as illustrated in (49).

(49) General configuration for IEs induced by focus
*[... Foc-P [focus alternatives ... ordinary alternatives ...]]

Note that there is no mention of interrogative *wh*-expression in (49). All that matters is for ordinary alternatives to co-occur with focus alternatives in the scope of a focus-sensitive operator. Based on previous studies, *wh*-expressions evoking ordinary alternatives are not necessary to be interpreted interrogatively. Therefore, if the configuration in (49) is on the right track, the occurrence of IEs is expected to be independent of interrogative constructions.

According to Li & Law, this prediction is verified by a series of cross-linguistic phenomena, two of which are sketched in this subsection.[9]

It is well known that Mandarin *wh*-expressions may receive a non-interrogative indefinite interpretation. Besides, Lin (2004) points out that a *wh*-indefinite may interact with other scope-bearing elements. For example, in (50), the *wh*-indefinite can take narrow or wide scope relative to negation, giving rise to a scope ambiguity.

(50) Kěnéng Lǐbái méi zuò-duì nǎ-dào tí ba.
possibly Libai not do-right which-CL exercise SFP
a. 'It is possible that Libai didn't solve any (significant) problem.' (*not* > WH)
b. 'It is possible that there is some problem that Libai didn't solve.' (WH > *not*)

Interestingly, when the subject associates with a focus-sensitive particle, as in (51), only the narrow scope reading of the *wh*-indefinite is available. The wide-scope reading is blocked.

(51) Kěnéng **zhǐyǒu** LǏBÁI méi zuò-duì nǎ-dào tí ba.
possibly only Libai not do-right which-CL exercise SFP
a. 'It is possible that only LIBAI didn't solve any (significant) problem.'
b. #'It is possible that there is some problem that only LIBAI didn't solve.'

It is agreed in the literature that the scope of a *wh*-indefinite is determined by its licensor like negation, modals, or the conditional mark like *rúguǒ* 'if'. In (51), either the negative item *méi* 'not' or the possibility modal *kěnéng* 'possibly' can license the indefinite use of the *wh*-expression. Under the framework of alternative semantics, that a licensor licenses a *wh*-indefinite means that the licensor functions as a closure to close the alternatives evoked by the *wh*-expression. In this sense, the ordinary alternatives evoked by the *wh*-expression in (51) can be closed by the negative item or the modal. If the latter serves as the licensor, the ordinary alternatives would still be available in the scope of the focus-sensitive particle. As a consequence, they must interact with the focus alternatives evoked by the focus expression, triggering FIEs.

Moreover, besides *wh*-expressions, disjunctive expressions also evoke alternatives at the ordinary dimension of meaning (Alonso-Ovalle 2006; Simons 2005; a.o.). If the generalized configuration in (49) is correct, IEs should surface in sentences with disjunctive expressions in the same environments leading to IEs. This prediction is borne out by disjunctive sentences, as exemplified in (52).

(52) **Zhǐyǒu** YUĒHÀN chī-le píngguǒ huòzhě lí.
only John eat-PERF apple or pear
a. 'John is the only person who ate apples or pears.' (only JOHN > or)
b. #'Only John ate apples or only John ate pears.' (or > only JOHN)

In (52), the disjunctive expression can only take narrow scope relative to the focus expression (Crain 2012), which means that the ordinary alternatives evoked by the disjunctive expression is closed in the same way as *wh*-indefinites inside the scope of the focus expression. As a consequence, the focus alternatives evoked by the focus expression does not interact with the ordinary alternatives. No IEs are expected. By contrast, if the disjunctive expression scoped over the focus expression, the ordinary alternative would not be closed until the root of the sentence. Therefore, both the focus and ordinary alternatives are available within the scope of the focus-sensitive particle, compositionally giving rise to FIEs.

Although the analysis extends the empirical domain of FIEs, Li & Law also admit that it does not explains QIEs. Instead of pursuing a potential uniform approach, they suggest that QIEs and FIEs have different natures. The main reason is that cross-linguistically focus interveners form a homogeneous class, while quantifier interveners a heterogenous class (see Section 2). Extending an analysis based on either type of IEs to the other may not be a desirable move.

3.2.2 The topicality approach

Although no comprehensive analysis has been offered for QIEs in Mandarin so far, Jin (2020) proposes a semantic approach to QIEs in Mandarin *why*-questions. Based on Ko (2005) and

Tsai (2008), he assumes that Mandarin *why—wèishénme* occupies a position in the CP domain. As a result, in a *why*-question, *wèishénme* is structurally higher than the subject. Hence, the word order where a subject precedes *wèishénme*, as illustrated in (53), must be derived via the topicalization of the subject.

(53) Lǐbái *wèishénme* cízhí?
Libai why resign
'Why did Libai resign '

Given the high position of *wèishénme*, quantifiers preceding it must undergo toplicalization. Following Ko (2005), however, Jin argues that downward entailing quantifiers are not topicalizable. The failure of topicalization leads to the unacceptability of the following sentences, i.e., QIEs in *why*-questions.

(54) ?? { **Zuìduō yì-gè** at.most one-CL / **Méi-yǒu** not-have } xuēshēng wèishénme cízhí?
student why resign

Jin further explains why downward entailing quantifiers cannot undergo toplicalization. As noticed by Chierchia (1993) and Reinhart (1997), downward entailing quantifiers cannot be mapped to a set of individuals, as they do not have a non-empty minimal witness set. Simply speaking, the witness sets of the quantifier *at most one student* includes two subsets of the student set: one includes one student, and the other is the empty set.[10] Consequently, there is no non-empty smallest set of students that could satisfiy the truth-conditional requirement of *at most one student*. Jin proposes that this kind of quantifier cannot be interpreted as a referential nominal and hence cannot be used as topic.

3.3 Pragmatics approaches

Tomioka (2007) gives a general critique of syntactic and semantic approaches to IEs. Based on Japanese and Korean, he observes that the judgments of IEs are far from uniform and the variability among native speakers is vast. This casts doubt on syntactic and semantic approaches, which predict that IEs are categorically ungrammatical. Therefore, he identifies IEs as a pragmatic phenomenon and proposes that IEs result from a mismatch at the level of Information Structure. In terms of Information Structure, a *wh*-question is partitioned into two components: the *wh*-expression acts as the sentential focus, while the the rest of the *wh*-question is discourse-old or given in the sense of Schwarzschild (1999). A crucial assumption is that a sentence contains one and only one sentential focus. Hence, in an IE configuration with a focus intervener like (55), the focus intervener is located in the given component, yielding an information mismatch.

(55) Given: ... [Focus intervener] ... [WH]; WH: Focus

By contrast, a *wh*-expression can enforce all the elements following it to be given at the level of Information Structure. This is evidenced by the fact that the materials coming to the right of a *wh*-expression is prosodically reduced at least in Japanese and Korean. Therefore, when a focus expression follows a *wh*-expression, it gets de-accented and becomes given. No information mismatch appears.

Moreover, Tomioka explains QIEs in a uniform way. He notices that in Japanese and Korean both quantifier interveners behave similar to focus interveners in that they all resist a topic marker. It means that, like focus interveners, quantifier interveners cannot be recognized as topics or discourse-old information.

Following Tomioka, Eilam (2011) argues that FIEs are sensitive to context. In particular, FIEs disappear if a context is provided that turns an intervener into given information. For example, in Mandarin, providing a context which backgrounds a potential intervener in a *wh*-question greatly improves the status of the question, as witnessed in (56).

Context: The class was assigned two book reports. Lili read one book that everyone else had read, but there was one book that only she had read.

(56) (?)**Zhǐyǒu** LÌLI dú-le nǎ-běn shū?.
only Lili read-PERF which-CL book
'What is the book x such that only LILI read x?' (Eilam 2011: 70-71)

The effect of contextual sensitivity is also reported in French (Glasbergen 2021). If context can significantly improve or even eliminate IEs, the syntactic or semantic approaches are indeed challenged. However, judging IE configurations under context leads to more variabilities of acceptability among native speakers. So, only counting on introspective judgments may not form a convincing argument.

Li and Law (2022) conduct two experiments to probe the role of context in IEs. Experiment 1 (Exp1) compared three question structures *without* any accompanying context—plain *wh*-questions (**Plain**, (58)), FIE questions (**Target**, (57)), and questions with fronted *wh*-expressions (**Fronted**, (59)). Experiment 2 (Exp2) compared the same three question structures *with* an accompanying context, an example of which is provided in Figure 1. Note that the expression being focused (i.e., *Xiaoqi*) is mentioned in the context, which shows that only Xiaoqi bought a different magazine, and hence is part of the background information. In both experiments, 21 sets of experimental stimuli in three conditions were distributed across three lists in a Latin-square design.

(57) *__Zhíyǒu__ XIǍOQÍ mǎi-le ná-běn zázhì ne?
only Xiaoqi buy-PERF which-CL magazine QP
Intended 'Which magazine is the one that only Xiaoqi buy?' (Target)

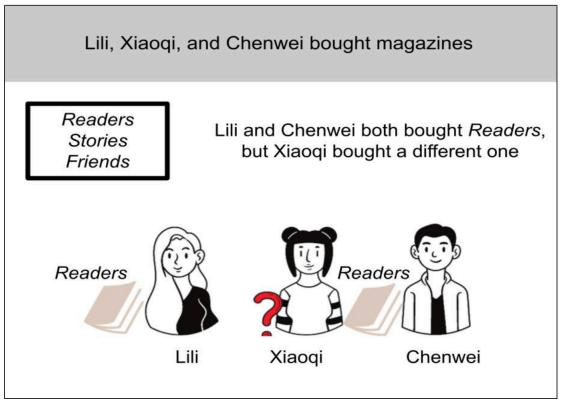


Figure 1: A sample context
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(58) Xiǎoqí mǎi-le ná-běn zázhì ne?
Xiaoqi buy-PERF which-CL magazine QP
'Which magazine did Xiaoqi buy?' (Plain)

(59) Ná-běn zázhì **zhíyǒu** XIǍOQÍ mǎi-le ne?
which-CL magazine only Xiaoqi buy-PERF QP
'Which magazine is the one that only Xiaoqi buy?' (Fronted)

In each trial in both experiments, the participant did a rating task based on a 5-point Likert scale. The descriptive labels are as follows: 1 = completely unnatural, 2 = basically unnatural, 3 = marginally natural, 4 = basically natural, 5 = completely natural. In Exp2, the task was preceded by a context. The participant had to answer a comprehension question after seeing the first context, which ensured that their understanding of the context was correct. 151 and 155 participants took part in the two experiments.

Out of the three sentence types, **Target** received the lowest rating with and without context, in the 'unnatural' range of the scale, as shown in Figure 2. **Context** improved the acceptability rating of all question types (β=0.47, SE=0.18, z = 2.67 p <.01), while also interacting significantly with **structure** in the **Target** condition (β =0.83, SE= 0.074, z=11.3, $p < .001$), raising its mean rating from 2 to 2.7. However, context was insufficient to eliminate IEs.

The experimental results show a facilitation effect of context in the acceptability judgments, but the facilitation effect does not fully ameliorate the judgments of IE sentences. These results are more compatible with the syntactic and semantic approaches than the pragmatic approach. Basically, IE sentences are classified into the category of unacceptable sentences. The contextual facilitation effect is also expected in a syntactic or semantic analysis.[11]

4 Further issues relating to IEs

The present article summarizes the generalizations of IEs in Mandarin as well as reviews the accounts for this kind of effect. Basically, in Mandarin weak quantifiers and focus expressions

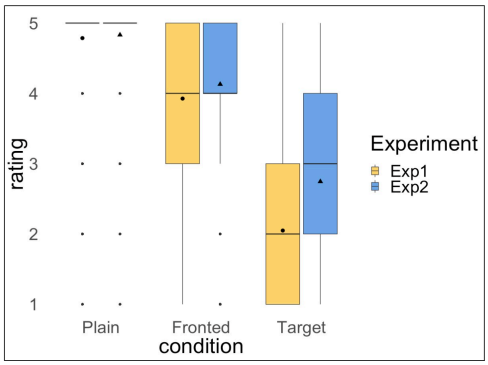

Figure 2: Experimental results
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induce QIEs and FIEs, respectively, when they precede a *wh*-expression. The exploration of IEs in Mandarin has also driven theoretical developments in various research areas, like locality conditions of syntactic operations and interrogative–focus interactions.

Despite over a decade of research on IEs, there are still many issues that require further investigation. The major ones are:

- Why do weak quantifiers, but not strong ones, trigger QIEs in Mandarin?
- What factors underlie the cross-linguistic diversity of quantifier interveners?
- Should QIEs and FIEs receive a uniform account?

In addition to the approaches reviewed in the present paper, prosody may also play a role in IEs, especially FIEs. Briefly, that a focus expression precedes a *wh*-expression might lead to prosodic ill-formedness, which underlines FIEs. The adequacy of a prosodic account requires further research on the prosodic interaction of these two types of expressions, ideally building on their respective independent prosodic properties.

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Further Reading

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Notes

[1] In a *wh*-movement language, IEs are usually observable in multiple-*wh* questions, which contain in-situ *wh*-expressions that may be preceded by interveners (Beck 1996; Pesetsky 2000; Haida 2007; Mayr 2014; Kotek 2014; Kotek and Erlewine 2016; a.o.).

[2] The list of glossing abbreviations is given as follows: PERF: perfective marker; CL: classifier; PLC: plural classifier; AFFIR: affirmative marker; PLU: plural marker; SFP: sentence-final particle; QP: question particle.

[3] These observations also challenge Zhang's (2023) semantic–pragmatic account for FIEs, which also predicts that FIEs are triggered by exhaustive focus associating with *only*.

[4] A reviewer notices that *wèishénme* 'why' can follow *shì* in (60). While this observation is intriguing, it does not directly challenge the generalization about FIEs in *wh*-adverbial questions.

(60) Nǐ zhèyàng zuò dàodǐ shì wèishénme?
you this-way do on-earth be why
'Why on earth did you do that?'

Specifically, *shì* and *wèishénme* in this example may not be used as a focus-sensitive particle and a *wh*-adverbial. First, *shì* is used as a copular verb. It is not clear that the copular use is still focus-sensitive. Second, *wèishénme* is used as a predicate, instead of an adverbial. So, *wèishénme* may be analyzed as a short form of *wèi-le shénme* 'for what', because the preposition *wèi* 'for' can form a predicate in Mandarin.

[5] The spirit of Soh's analysis is aligned with Hoji's (1985) and Beck's (1996) earlier analyses of IEs in Japanese and German, where IEs are proposed to result from the blocking of LF movement.

[6] Xue's (2016) argument is based on Tsai's (2004) observation that the focus sensitive particle *zhǐ* 'only' cannot associate with a strong quantifier, as illustrated by (61).

(61) *Āqiū **zhǐ** mà-le MĚI-GÈ rén.
Aqiu only curse-PERF every-CL person
'Aqiu only cursed every person'

However, the unacceptability of (61) does not necessarily mean that strong quantifiers cannot serve as focus associates. (38) is a counterexample. The reason why (61) cannot be accepted may be because the maximality inference of *měi-gè* conflicts with the contrastive requirement of *zhǐ*, which requires that some of the people be cursed by Aqiu but not everyone (see also Coppock and Beaver 2014).

[7] In addition to the analyses reviewed in this subsection, Haida (2007) and Mayr (2014) provide another two semantic accounts. Since these two accounts are largely built on German and have not been adopted by research on IEs in Mandarin, they will not be reviewed in this subsection.

[8] The analysis of Foc-WH association sketched here is not the same as the one proposed in Li and Law (2016), but it is still compatible with Li & Law's analysis of FIEs.

[9] Following the spirit of generalized FIEs, Qing (2018) argues that the interaction of *wh*-expressions and the adverb *dōu* 'all' in Mandarin forms a sub-class of FIEs. His analysis also relies on the compositional interaction of focus and ordinary alternatives, though the concrete derivation is different from Li and Law's (2016).

[10] W is a witness set of a generalized quantifier $\mathcal{Q}$ iff $W \in \mathcal{Q}$ and W is a subset of the live-on set of $\mathcal{Q}$ (Barwise and Cooper 1981).

[11] A similar result has also been reported by Cao and Law (2022). In their experiments, the relevant contexts were described in texts.