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RESEARCH ARTICLE

True *wh*-movement and *wh*-in-situ in one language: Evidence from Colloquial Singapore English

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Abstract

wh-fronting questions (as in English) are analyzed as *wh*-movement while *wh*-in-situ questions (as in Chinese) are analyzed as LF movement or unselective binding. Optionality between the two types of questions is observed in many languages, however, upon closer inspection, a stream of previous literature argues that only one strategy is truly available in any given language. Cheng (1991) and Faure & Palasis (2021) argue that *wh*-fronting languages in Indonesian and Colloquial French are not derived by *wh*-movement, while Chang (2016) argues that *wh*-in-situ questions in Colloquial Singapore English (CSE) are not derived from unselective binding or LF movement but are declarative syntax questions. Bobaljik & Wurmbrand (2015) explicitly propose that a language can either have the true *wh*-in-situ or the *wh*-movement strategy, but not both.

This paper uses CSE as a case study and argues that it allows true *wh*-movement and true *wh*-in-situ questions. CSE has been argued to only allow *wh*-movement by some (Chang 2016) and to only allow *wh*-in-situ by others (Lan 2016). This study experimentally tests the predictions made by these analyses and shows that the patterns are best accounted for if both 'true' *wh*-movement and 'true' *wh*-in-situ questions exist in CSE (see also Sato & Ngui 2017), thus challenging the previous analyses for CSE, and the cross-linguistic generalization in Bobaljik & Wurmbrand 2015.

1. *Wh*-Optionality Across Languages

Across languages, *wh*-questions are expressed by two main strategies. One involves having the *wh*-element at the sentence-initial position, as shown in English in (1). The classic syntactic approach to *wh*-fronting involves *wh*-movement of the *wh*-element to the specifier position of the CP headed by a null complementizer head with a question feature [+Q] shown in (2). In this paper, I will use '*wh*-fronting' as a theory-neutral term to refer to questions like (1) and use '*wh*-movement' as an analysis for *wh*-fronting questions.

(1) *wh*-fronting: What did Mary eat?

(2) *wh*-fronting as wh-movement: $[_{CP}$ What $[_{C'}$ $C_{[+Q]}$ $[_{TP}$ Mary eat t_{what}]]]

As the other strategy, the *wh*-element stays in its base-generated position, hereinafter labeled as *wh*-in situ. Languages including Mandarin Chinese and some varieties of English, for example, Colloquial Singapore English (CSE), use this strategy as shown in (3) where the *wh*-element stays in the object position. Note that CSE optionally marks tense and includes a set of sentence-final particles like *ah*, as shown in (3b).

(3) (a) Zhangsan chi-le shenme
Zhangsan eat-ASP what
'What did Zhangsan eat?' Mandarin Chinese

(b) Mary eat what ah
'What did Mary eat?' CSE

wh-in-situ questions have received different analyses. The covert/LF movement analysis (Huang 1982) argues that in *wh*-in-situ questions, the same *wh*-movement occurs in a covert component of grammar, usually identified as the logical form (LF). Thus, the structure for sentences like (3a) is identical to the one in (2), except that the *wh*-element is pronounced at its base-generated position, that is, the object of the verb. On the other hand, the unselective binding analysis (Pesetsky 1987, Tsai 1994 among others) proposes that *wh*-in-situ questions do not involve *wh*-movement at all. Instead, the $C_{[+Q]}$ head binds the *wh*-element at its base-generated position, as is shown in (4). The binding relation is indicated by the index *i*. See Lu et al. (2020), Tian et al. (2022) for a recent discussion of the two analyses based on experimental evidence. Putting their differences aside, both analyses of *wh*-in-situ questions utilize the syntactic feature [+Q] to derive the question meaning, similar to the *wh*-movement analysis for *wh*-fronting questions mentioned above.

(4) *wh*-in-situ as unselective binding: $[_{CP}\ C_{[+Q]i}\ [_{TP}$ Mary eat what$_i$]]

Despite the research looking into the similarities and differences between *wh*-fronting and *wh*-in-situ questions, including their interpretations and restrictions, the question of whether one language can use both of these strategies is still under debate. Many languages that seem to allow both types of questions are argued to only allow *wh*-movement or *wh*-in-situ (LF movement/unselective binding), upon closer scrutiny. For example, Cheng (1991) argues that Indonesian is a *wh*-in-situ only language, and the *wh*-fronting questions in Indonesia are cleft sentences not derived by *wh*-movement (cf. Cole & Hermon 1998). Faure & Palasis (2021) argue that Colloquial French is a *wh*-in-situ language and movement of *wh*-items in *wh*-fronting questions is not triggered by a Question operator but rather an Exclusivity operator. From the other direction, Bobaljik & Wurmbrand (2015) argue that in languages with *wh*-movement, *wh*-in-situ questions are not derived via LF movement or unselective binding, unlike Chinese and other 'true' *wh*-in-situ languages. For example, while North American English primarily uses *wh*-fronting, cases of *wh*-in-situ do appear, as is shown in (5b) (Ginzburg & Sag 2000).

(5) (a) What's your boy's name?
(b) Your boy's name is what? [McNulty, The Wire, season 1, episode 1] (Bobaljik & Wurmbrand 2015: ex. 2)

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Although Example (5) might be perceived as English allowing both strategies, Bobaljik & Wurmbrand (2015) propose that the apparent *wh*-in-situ question in (5b) is a 'declarative syntax question' (DSQ), with the syntax of a declarative sentence as shown in (6). There is no C with the [+Q] feature in the structure, unlike the *wh*-fronting or the *wh*-in-situ questions in English, Mandarin and CSE. The question interpretation of DSQs results entirely from pragmatic mechanisms (see also Ginzburg & Sag 2000).

(6) Declarative syntax question (DSQ): [$_{CP}$ [$_{C'}$ *C* [$_{TP}$ Mary eat what]]]

One definitive diagnostic that can tease apart DSQs and true *wh*-in-situ questions is that DSQs cannot be embedded under question-selecting predicates like *wonder*, *ask* and *want to know* to form an indirect question. These predicates require the embedded CP to have a [+Q] feature, and DSQs lack [+Q] on their C heads. The sentences in (7) show that the so-called *wh*-in-situ questions in English indeed cannot be embedded under *wonder*, indicating that they are DSQs, while *wh*-fronting questions have no such restrictions, confirming the presence of [+Q]. The sentence in (8) shows that *wh*-in-situ questions in Mandarin can be embedded under *want to know*, thus are not DSQs. According to Bobaljik & Wurmbrand (2015), languages that pattern with English include German, Dutch, Icelandic, American Sign Language, Brazilian and European Portuguese, while Turkish, Chinese and Japanese are true *wh*-in-situ languages.

(7) (a) *I wonder I should put this stuff where. (DSQ)
(b) I wonder where I should put this stuff. (*wh*-fronting question embedded)

(8) Wo xiang-zhidao Zhangsan chi-le shenme
I want-know Zhangsan eat-ASP what.
'I want to know what Zhangsan ate' (true *wh*-in-situ question in Chinese)

Bobaljik & Wurmbrand (2015) further propose the generalization in (9): In a language that allows *wh*-fronting questions, the seemingly *wh*-in-situ questions must be DSQs. In other words, it is impossible for one language to contain both *wh*-movement and true *wh*-in-situ questions (be it covert *wh*-movement or unselective binding).

(9) DSQ/ *wh*-in-situ generalization: If a language has *wh*-movement (to SpecCP), then *wh*-movement is obligatory in indirect questions. Equivalently: If a *wh*-movement language allows 'optional' *wh*-in-situ, the in-situ construction is blocked in selected questions. (Bobaljik & Wurmbrand 2015: ex. 1)

If the generalization in (9) is on the right track, languages that seemingly allow both *wh*-fronting and *wh*-in-situ questions can be classified into two groups. Group 1 (true *wh*-movement) allows *wh*-movement only, and not covert *wh*-movement or unselective binding. The *wh*-in-situ questions in these languages are necessarily DSQs. Group 2 allows true *wh*-in-situ questions (derived via covert *wh*-movement or/and unselective binding). The *wh*-fronting questions in this group are necessarily derived via other operations (e.g. cleft, focus movement, etc.). Indonesian (following Cheng 1991) and Colloquial French (following Faure & Palasis 2021) would belong to this group, as their *wh*-fronting questions are argued to be not derived by *wh*-movement. On the other hand, to falsify the generalization, one would show that a language allows both *wh*-fronting questions derived by *wh*-movement

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and *wh*-in-situ questions that can be embedded under question-selecting predicates. This paper argues that CSE fits this profile.

CSE is an interesting test case since alternative analyses of both kinds of *wh*-questions in CSE have been proposed, potentially corroborating the generalization. Chang (2016) proposes that *wh*-in-situ questions in CSE are indeed DSQs, instead of true *wh*-in-situ questions (cf. Sato & Ngui 2017). Lan (2016), on the other hand, proposes that the *wh*-fronting questions in CSE do not involve *wh*-movement, but rather are cleft sentences, similar to Bahasa Indonesia (Cheng 1991). If either of these proposals is correct, CSE would conform to the generalization in (9).

This paper uses methods from experimental syntax and shows that predictions from the two alternative analyses for *wh*-questions in CSE are not borne out. This indicates that CSE indeed allows both *wh*-question strategies, challenging the DSQ/*wh*-in-situ generalization. Regarding methodology, setting the empirical record straight for a contact language like CSE can be tricky, as it is subject to a greater degree of individual variation. While previous studies in CSE have utilized methods from experimental syntax (Chang 2016, Sato & Ngui 2017), experiments in the current paper feature the factorial design which controls for potential confounds and is widely used in experimental syntax.

The rest of the paper will proceed as follows. Section 2 provides a basic introduction of CSE. Section 3 argues for the availability of true *wh*-in-situ in CSE. Section 4 argues for the availability of true *wh*-fronting in CSE. Section 5 discusses theoretical implications.

2. Colloquial Singapore English

CSE, also known as Singlish, is a contact language with a dominant English lexifier and is strongly influenced by its various substrate languages, including Mandarin Chinese, Malay and local Sinitic languages. CSE allows both *wh*-fronting and *wh*-in-situ as is shown in (10). The options would present an apparent counter-example to Bobaljik & Wurmbrand's generalization, if the *wh*-fronting question in (10a) involves *wh*-movement and the *wh*-in-situ question in (10b) is not a declarative syntax question. For more work on *wh*-questions in CSE, see Chow (1995), Bao (2001), Kim et al. (2009), Yeo (2010), Sato (2013) among others.

(10) Chow (1995: 25)
  (a) Where John can buy the durians
  'Where can John buy the durians?' (*wh*-fronting)
  (b) John can buy the durians where
  'Where can John buy the durians?' (*wh*-in-situ)

However, two analyses of CSE questions can, in principle, salvage the generalization. The first analysis is one where the *wh*-in-situ questions in CSE are indeed DSQs, proposed by Chang (2016). This would put CSE in the camp of varieties of English that are considered more 'inner circle Englishes'. The second analysis is put forward by Lan (2016), where the *wh*-fronting questions in (10a) do not involve *wh*-movement but are analyzed as cleft sentences where the *wh*-element is base-generated at the beginning of the sentence. This puts CSE together with Mandarin and other varieties of Chinese, that is, languages that only allow *wh*-in-situ and not *wh*-fronting questions.

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We will discuss three experiments in CSE showing that neither of the analyses is supported: the *wh*-in-situ questions in CSE do not show the same distribution as DSQs and the *wh*-fronting questions in CSE do not show properties of cleft sentences. Thus, both the DSQ analysis and the cleft analysis for CSE are challenged. The generalization in (9), in turn, is also challenged as CSE does allow both *sc*-movement and true *wh*-in-situ questions.

3. True *wh*-in-situ in CSE

This section discusses the DSQ analysis for *wh*-in-situ questions in CSE and argues that DSQ cannot be the only source for *wh*-in-situ questions in CSE. In other words, 'true' *wh*-in-situ questions do exist in CSE.

3.1. Declarative Syntax Question analysis for *wh*-in-situ questions in CSE

As mentioned above, non-echo *wh*-in-situ questions have been observed in English, German and other *wh*-fronting languages (Ginzburg & Sag 2000, Bobaljik & Wurmbrand 2015), shown in (11).

(11) Bobaljik & Wurmbrand 2015: ex. 5
  (a) Seeing somebody reading :
  You are reading what?
  (b) Discussing pot-luck plans :
  Diane's baking a cake, Magda's buying bagels and Harry's bringing what?

Although on the surface, these questions are similar to true *wh*-in-situ questions in Chinese and Japanese, Bobaljik & Wurmbrand (2015) observe that the questions in (11) cannot be embedded under question-selecting predicates like *wonder* or *ask.* In other words, *wh*-in-situ questions in (11) cannot function as indirect questions as shown in (12). The same restriction is found in German, Dutch, French, Icelandic, (Brazilian) Portuguese and American Sign Language.

(12) Bobaljik & Wurmbrand 2015: ex. 8
  (a) *He asked me your boy's name is what.
  (b) *I wonder I should put this stuff where.

Importantly, *wh*-in-situ questions in Chinese and other 'classic' *wh*-in-situ languages do not have this restriction, as shown in (13). *wh*-in-situ questions can be embedded under a question-selecting predicate.

(13) wo xiang-zhidao wo yinggai ba zhejian dongxi fang zaina
  I want-know I should BA this stuff put where
  "I want to know where I should put this stuff." (Chinese)

Based on this contrast, Bobaljik & Wurmbrand (2015) propose that the questions in (11) have a different structure from the 'true' *wh*-in-situ questions in (13). The question-

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selecting predicate selects a CP that is specified as [+Q]. The incompatibilities in (12) indicate that the *wh*-in-situ questions in (12) are not [+Q]. Instead, these embedded 'questions' have exactly the same syntax as a declarative sentence. The question meaning of such DSQs results from a pragmatic process.

Chang (2016) proposes that CSE is another language that only allows *wh*-fronting and does not allow true *wh*-in-situ. The seemingly *wh*-in-situ languages in CSE are declarative syntax questions. The proposal is built on the observation that *wh*-in-situ questions under question-selecting predicates are degraded compared to the *wh*-fronting versions, as is shown in (14). The contrasts in (14) are based on two surveys that Chang conducted with 18 and 10 speakers, respectively.

(14) ex. 40–42 in Chang 2016
- (a) John want to know who Lisa marry.
- (b) *John want to know Lisa marry who.
- (c) John want to know what Lisa buy.
- (d) *John want to know Lisa buy what.
- (e) John want to know where Lisa go.
- (f) *John want to know Lisa go where.

However, the robustness of the contrast is debatable. Sato & Ngui (2017) argue that both *wh*-in-situ and *wh*-fronting questions are allowed under question-selecting predicates in CSE. They conducted a survey with the sentences in (15) with 13 CSE speakers, and the majority (11/13) of the speakers found all of them acceptable. In other words, no contrast was found in this survey. Based on this result, Sato & Ngui (2017) argue that CSE falsifies the cross-linguistic generalization from Bobaljik & Wurmbrand (2015), contra Chang (2016).[1]

(15) ex. 13–15 in Sato & Ngui 2017
- (a) I wonder what Mary bought already.
- (b) I wonder Mary bought what already.
- (c) I wonder what John bought for Peter.
- (d) I wonder John bought what for Peter.
- (e) John ask who the rice is for.
- (f) John ask the rice is for who.

Although the results are distinct, the surveys in Chang (2016) and Sato & Ngui (2017) share a flaw in their design. The surveys assume that if *wh*-in-situ questions are dispreferred as opposed to *wh*-fronting questions under question-selecting predicates, the *wh*-in-situ questions in CSE are incompatible with question-selecting predicates. However, there is another way to interpret the contrast in (14). In a scenario where *wh*-in-situ questions are

[1] The current paper will eventually reach the same conclusion as Sato & Ngui (2017): CSE allows both true *wh*-in-situ and *wh*-movement, hence presents a counter-example for the DSQ generalization in (9). However, two aspects of the current paper went beyond Sato & Ngui (2017): (1) as will be specified, we use a factorial design to further control for potential confounds which experiments from both Chang (2016), Sato & Ngui (2017) suffer from, and (2) we discuss an analysis where *wh*-fronting questions in CSE are not derived from *wh*-movement in Lan (2016), which was not engaged with in Sato & Ngui (2017).

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allowed under question-selecting predicate, but there is a general dispreference of *wh*-in-situ in CSE, we would still expect the contrast reported in (14). In other words, the contrast could be between *wh*-in-situ and *wh*-fronting in general, not related to question-selecting predicates. This confound casts doubts on conclusions in both Chang (2016) and Sato & Ngui (2017) as they share the same design.

In the next section, we report an experiment with a 2*2 factorial design that is free of this confound. Our results show that contrary to Chang (2016) and compatible with Sato & Ngui (2017), *wh*-in-situ questions under question-selecting predicates do not induce degradation in judgments, *compared to wh-fronting questions under question-selecting predicates.* Thus, the DSQ analysis cannot be the only source for *wh*-in-situ questions in CSE. It is important to note that we are not arguing that DSQs do not exist in CSE. We assume the English-type DSQs exist in most, if not all, languages. Rather, our findings show that not all *wh* in-situ questions in CSE are DSQs. Thus, the mechanism behind true *wh*-in-situ must exist in CSE.

3.2. Experiment 1: Embedded *wh* in-situ under question-selecting predicates

3.2.1. Design

Experiment 1 investigates whether *wh*-in-situ questions can be embedded under question-selecting predicates in CSE. It has two factors: *wh*-STRATEGY (MOVE vs. IN-SITU) and EMBEDDING (MATRIX vs. EMBEDDED). An example of each condition is shown in (16). The questions in the EMBEDDED conditions are embedded under the question-selecting predicate 'want to know'. Sentences in the MATRIX conditions are matrix questions with an extra prepositional phrase modifier (*for dinner* in (16)) to keep the length of the sentences more similar to the other conditions.

(16) (a) What Sarah cook for dinner last week? (MOVE.MATRIX)
(b) Sarah cook what for dinner last week? (IN-SITU.MATRIX)
(c) Zhi Yang want to know what Sarah cook last week. (MOVE.EMBEDDED)
(d) Zhi Yang want to know Sarah cook what last week. (IN-SITU.EMBEDDED)

In this design, the acceptability difference between MOVE.MATRIX and IN-SITU.MATRIX (D1) is driven by the general preference between the two *wh*-strategies. The difference between MOVE.EMBEDDED and IN-SITU.EMBEDDED (D2) also includes the effect of this general preference. If there is an additional penalty of embedding *wh*-in-situ under question-selecting predicates (i.e. if DSQ is the only source for *wh* in-situ in CSE as is claimed by Chang 2016), D2 would also include this penalty. As a result, D2 should be notably larger than D1, and the statistical analysis should reveal a statistically significant interaction between the two factors. Moreover, the IN-SITU.EMBEDDED condition should have a low rating as it is predicted to be unacceptable like (12) under the DSQ analysis. Note that the 2*2 factorial design controls for the general preference between the two *wh*-strategies that the previous surveys are confounded with: both D1 and D2 are affected by this preference, the comparison between D1 and D2 would cancel out its effect. This factorial design is widely used in experimental syntax literature to control for such confounds, especially in locality constraints like syntactic islands (see Sprouse et al. 2016 among others).

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3.2.2. Materials, procedures and participants

Eight lexical combinations were created for each condition, resulting in 32 test items in total. The test items are distributed in a Latin Square design. Each participant saw two items per condition. Each list also includes eight test sentences from Experiment 2 and 12 additional filler items. Experiments 1 and 2 were conducted in the single session with their test items intermixed with the filler items, thus their procedure and participants are identical. The experiment was conducted on PCIbex (Zehr & Schwarz 2018), where each participant was asked to rate how natural the sentences sound as CSE on a 7-point Likert scale, 1 being very unnatural and 7 being very natural. The instructions emphasized that the experiment is meant for CSE and not standard inner circle Englishes. The test sentences do not have tense or agreement marking as shown in (16), which is allowed in CSE but not standard inner circle Englishes. Thirty-six participants finished the experiment, all of whom were aged from 21 to 30, grew up in Singapore and use CSE on a daily basis. Each participant was compensated with 5 SGD for participation.

3.2.3. Results and analyses

The 7-point ratings were transformed to z-scores in order to control for individual bias in using the scale. Table 1 summarizes the condition means and standard deviations in raw ratings and z-scores. Each condition mean is based on 72 judgments. The condition means in raw ratings and the standard errors are plotted in Figure 1. As we can see, all four conditions are rated around 6 out of the 7-point scale, and all are above 0.6 in z-scores. Figure 2 shows the distribution of condition means by subjects. Judgments of all four conditions show a normal distribution, indicating that the judgments are largely homogeneous with moderate speaker variation.

We constructed a cumulative link mixed model on raw judgments using EMBEDDING and WHSTRATEGY as fixed factors and items and participants included as random factors. Treatment coding was applied to both factors (matrix: 1, embedded: –1; move: 1, situ: –1). It revealed no main effects of EMBEDDING ($p = .11$) but a main effect of WHSTRATEGY ($p = .02$). There is also no interaction between the two conditions ($p = .17$). The results are summarized in Table 2.[2]

Note that the acceptability of embedded *wh*-in-situ questions in this experiment cannot be due to participants parsing them as echo questions. As echo questions are questions about a

Table 1. Results from Experiment 1, n = 36.

Conditions	EMBEDDING	WHSTRATEGY.	Judgments	Standard deviation	z-scores	Standard deviation
MOVE.MATRIX	MATRIX	MOVE	6.44	1.01	0.90	0.47
IN-SITU.MATRIX	MATRIX	SITU	6.40	0.93	0.87	0.38
MOVE.EMBEDDED	EMBEDDED	MOVE	6.38	1.07	0.84	0.41
IN-SITU.EMBEDDED	EMBEDDED	SITU	5.96	1.18	0.66	0.55

[2] We also constructed linear mixed effect models based on z-scores for all four experiments reported in this paper. They did not reveal different results from the cumulative link mixed models in terms of interaction, thus we report the models based on the raw judgments for ease of interpretation.

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Figure 1. Condition means of raw judgment of Experiment 1, N = 36.

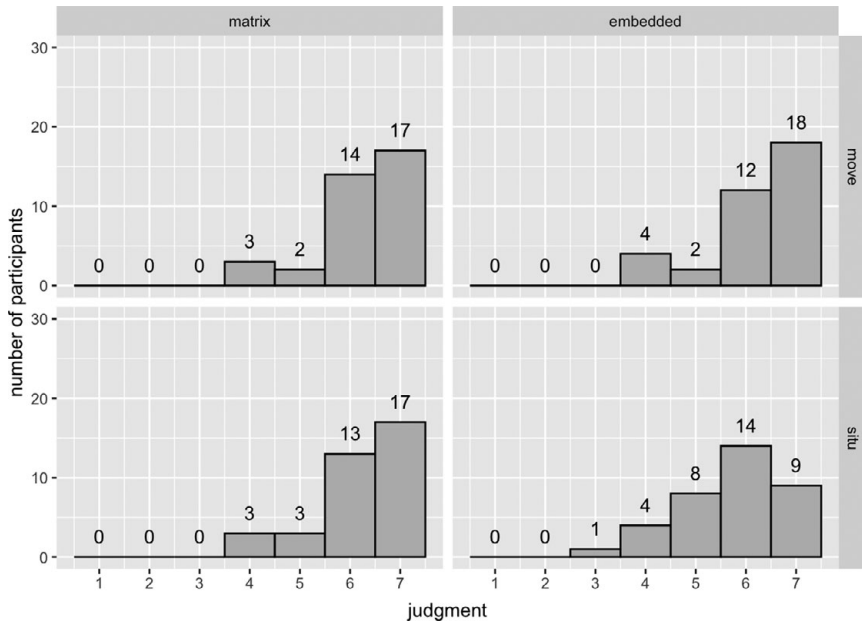

Figure 2. Distribution of condition means by subjects for Experiment 1. Condition means for each participant were calculated based on their two judgments of the conditions.

declarative sentence in the previous utterance, to parse B's utterance in (17) as an echo question, A's utterance needs to be a declarative sentence. This cannot be the case given the question-selecting predicate, the declarative sentence in A's utterance in (17) is itself ungrammatical. In other words, if the only sources for *wh*-in-situ questions in CSE

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Table 2. Results from the cumulative link mixed model, formula: judgment ~ embedding * whStrategy + (1 + embedding * whStrategy | subject) + (1 + embedding * whStrategy | lexical).

	Estimate	Standard error	z-value	Pr(>|z|)
Embedding	0.33	0.21	1.61	0.11
whStrategy	0.41	0.18	2.26	0.02
Embedding:whStrategy	–0.29	0.21	–1.38	0.17

are DSQs and echo questions, the acceptability of the IN-SITU.EMBEDDED condition is unexpected.[3]

(17) A: *Zhi Yang want to know Sarah cook pasta.
B (not hearing 'pasta'): Zhi Yang want to know Sarah cook what?

Given the high ratings of the IN-SITU.EMBEDDED condition and the lack of interaction between the two factors, results from Experiment 1 show *wh*-in-situ questions can be embedded under question-selecting predicates in CSE, contrary to the prediction of the DSQ analysis. Thus, DSQ cannot be the only source for *wh*-in-situ in CSE. In other words, true *wh*-in-situ questions do exist in CSE. Note that our conclusion is that the DSQ analysis cannot be the only source for *wh*-in-situ questions in CSE, *not* that DSQs do not exist in CSE.

3.3. English experiment on DSQs for comparison

Although no statistically significant factor was found on embedded *wh*-in-situ questions in CSE, the IN-SITU.EMBEDDED condition is rated lower than the other three conditions in Experiment 1. A reviewer asks if it is possible that the lack of interaction in Experiment 1 is due to the low number of participants (N = 36). To further verify the status of *wh*-in-situ questions in CSE, we conducted a similar experiment in North American English (NAE) with 35 participants for comparison. As laid out above, the DSQ analysis of *wh*-in-situ questions in NAE predicts that embedding such questions under question-selecting predicates would induce a clear penalty, as they are ungrammatical. If *wh*-in-situ questions in NAE are DSQs and *wh*-in-situ questions in CSE are true *wh*-in-situ questions, we would

[3] We thank a reviewer for pointing this out and concede that the IN-SITU.MATRIX condition could, in principle, be parsed as echo questions (shown in a context in (i) below). Crucially, even if some participants indeed parsed sentences in the IN-SITU.MATRIX condition as echo questions, the point of our experiments remains: given the acceptability of the IN-SITU.EMBEDDED condition, *wh*-in-situ questions in CSE are not exclusively DSQs or echo questions, thus true *wh*-in-situ questions do exist in CSE.

(i) A: Sarah cook pasta for dinner last week.
B (not hearing 'pasta'): Sarah cook *what* for dinner last week?

We also note that it is unlikely that all participants parsed the IN-SITU.MATRIX questions as echo questions, given that echo questions require specific contexts. The distribution shown in Figure 2 indicates that participants agree on the acceptability of these questions, which is expected if they parsed them as common information-seeking questions. See Figure 4 for the judgment distribution of *in-situ.matrix* questions in North American English for comparison, where the grammatical sources for such questions are echo questions and DSQs.

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expect a statistically significant interaction between the two factors and a low rating of the embedded *wh*-in-situ condition in NAE with a similar number of participants, assuming similar levels of noise in the two languages.

This experiment uses the same design as Experiment 1. Two factors were manipulated: *wh*-STRATEGY (MOVE VS. IN-SITU) and EMBEDDING (MATRIX VS. EMBEDDED). *Do* support and tense markings were added to sentences in the English conditions. Some of the names were replaced with more frequent names in North America. Examples of each condition are shown in (18). The experiment includes two items for each condition in (18) (eight test items), eight test items for Experiment 2 in NAE and 12 fillers. Thirty-five self-reported English monolingual speakers participated in the experiment, recruited via Prolific. Each participant was paid 1.5 GBP for their participation.

(18) (a) What did Ben buy from Whole Foods yesterday? (MOVE.MATRIX)
(b) Ben bought what from Whole Foods yesterday? (IN-SITU.MATRIX)
(c) Kevin wants to know what Ben bought yesterday. (MOVE.EMBEDDED)
(d) Kevin wants to know Ben bought what yesterday. (IN-SITU.EMBEDDED)

Mean ratings of the four conditions in raw judgments and z-scores and their standard deviations are summarized in Table 3. Figure 3 shows the conditions means and standard

Table 3. Results from the NAE DSQ experiment, n = 35.

Conditions	EMBEDDING	WHSTRATEGY.	Judgments	Standard deviation	z-scores	Standard deviation
MOVE.MATRIX	MATRIX	MOVE	6.66	0.54	1.09	0.22
IN-SITU.MATRIX	MATRIX	SITU	5.01	1.55	0.33	0.63
MOVE.EMBEDDED	EMBEDDED	MOVE	6.67	0.65	1.10	0.26
IN-SITU.EMBEDDED	EMBEDDED	SITU	2.30	1.34	–0.83	0.51

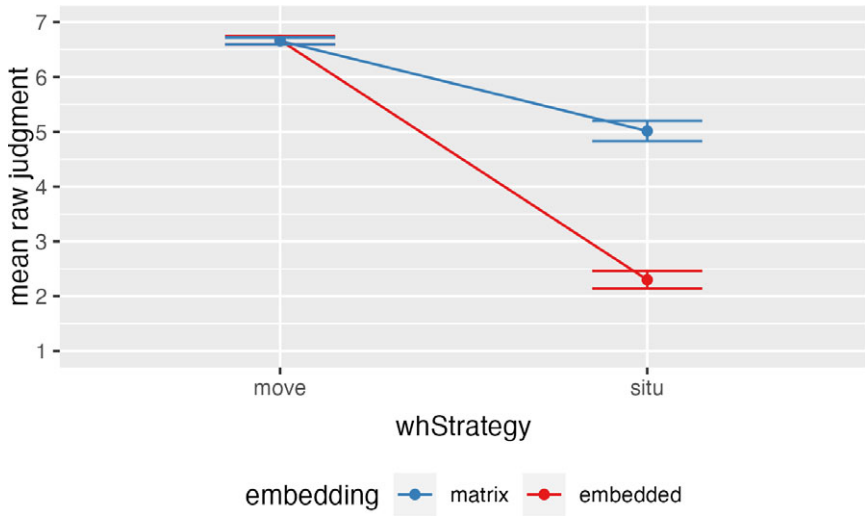

Figure 3. Condition means of raw judgments, N = 35.

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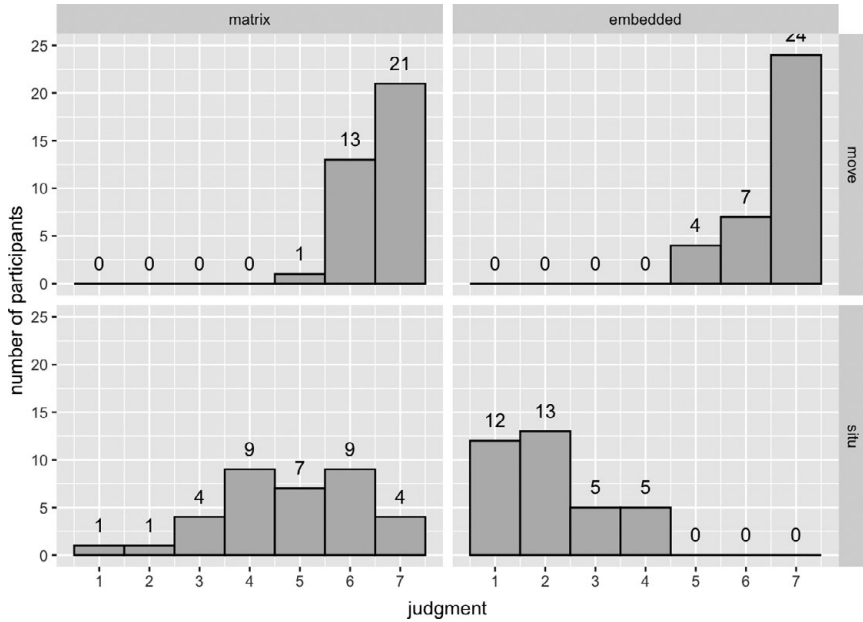

Figure 4. Distribution of conditions means by subject for NAE DSQ experiment, N = 35.

errors in raw judgments, and Figure 4 shows the distribution of condition means by subjects. The MOVE.MATRIX and MOVE.EMBEDDED conditions were rated near ceiling. The IN-SITU.MATRIX condition was rated a slightly lower mean of 5.01 and showed a considerable amount of speaker variation. This is expected given that *wh*-in-situ is not a common strategy to form a question in NAE. *Wh*-in-situ questions are accepted as echo questions or DSQs. It is possible that some participants treated the IN-SITU.MATRIX condition as echo questions or DSQs and gave it a higher rating, while others treated it as (ungrammatical) common information-seeking questions and gave it a lower rating. Crucially, the IN-SITU.EMBEDDED condition is rated close to the bottom of the scale (mean = 2.30). This is expected since sentences in this condition cannot be treated as echo questions, or, according to Bobaljik & Wurmbrand (2015), DSQs, given the question-selecting predicates.

We constructed a cumulative link mixed model to fit the raw judgments. Treatment coding was applied to both factors (MATRIX: 1, EMBEDDED: –1; MOVE: 1, SITU: –1). There was a

Table 4. Results from the cumulative link mixed model, formula: judgment ~ embedding * whStrategy + (1 + embedding + whStrategy | subject) + (1 + embedding * whStrategy | lexical).

	Estimate	Standard error	z value	Pr(>|z|)
Embedding	1.24	0.31	4.05	< 0.0001
whStrategy	3.87	0.52	7.38	< 0.0001
Embedding:whStrategy	–1.02	0.27	–3.84	< 0.001

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main effect of *wh*Strategy: conditions with *wh*-movement are rated higher than *wh*-in-situ. There was also a main effect of Embedding. Crucially, there was a significant interaction between the two factors: embedding *wh*-in-situ questions under question-selecting predicates induced an extra penalty. To our knowledge, this is the first experimental finding regarding the status of matrix and embedded *wh*-in-situ questions in NAE.

Results from Experiment 1 and the NAE experiment with the same design and a similar number of participants show that *wh*-in-situ questions are treated differently in two languages. Although the mean ratings of IN-SITU.MATRIX conditions in both languages are above 5, the distribution of the ratings in CSE was homogeneous, while there was a significant amount of speaker variation in NAE. This indicates that *wh*-in-situ questions in CSE are common information-seeking questions that require no special contexts, while the *wh*-in-situ questions in NAE are likely DSQs and/or echo questions that do require contexts to be acceptable. Crucially, the IN-SITU.EMBEDDED condition in NAE is unacceptable with a mean rating of 2.3, which is compatible with the DSQ analysis. The same condition in CSE has a mean rating of 5.96, compatible with the true *wh*-in-situ analysis. We thus conclude that DSQs cannot be the only source for *wh*-in-situ questions, and true *wh*-in-situ questions exist in CSE.

4. *wh*-movement in CSE

4.1. The cleft analysis for *wh*-fronting questions in CSE

Having established that CSE allows true *wh*-in-situ questions, this section argues for the existence of true *wh*-fronting questions in CSE which are derived by *wh*-movement as in English. As mentioned in Section 1, *wh*-fronting questions are typically analyzed to result from the *wh*-element undergoing *wh*-movement to the SpecCP headed by a C with [+Q]. A sample derivation is shown in (19), where the *wh*-element moves from its base-generated position (object of the verb) to the SpecCP position.

(19) $[_{CP}$ What$_1$ $C_{[+Q]}$ did $[_{TP}$ Mary $[_{vP}$ eat t_1]]]?

However, the *wh*-cleft analysis has been proposed for Bahasa Indonesia (Cheng 1991), Mandarin Chinese (Cheung 2014) and CSE (Lan 2016) as an alternative analysis for *wh*-fronting questions. Under this analysis, the seemingly 'fronted' *wh*-element is base-generated at its surface position. In other words, no *wh*-movement is involved in deriving *wh*-fronting questions. We will go over the *wh*-cleft analysis in this section, and the next section reports two experiments that show *wh*-cleft analysis for *wh*-fronting questions in CSE is untenable.

Focusing on CSE, Lan (2016) proposes that the *wh*-fronting questions in CSE are derived based on *it*-cleft sentences where the *wh*-word is base-generated at SpecFocusP as is shown in Example (20). The *wh*-word is coindexed with an empty operator (*op*) at the object position. Several elements, including *it*, *is* and *that* are elided, resulting in what seems to be a question with *wh*-movement. In other words, the *wh*-fronting questions in CSE, although similar to those in inner circle Englishes on the surface, are derived in a different way, with no *wh*-movement of the *wh*-element.

(20) ~~It is~~ $[_{FocusP}$ who$_1$ $[_{CP}$ ~~that~~ Sally loves op$_1$]]?

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Lan (2016) provides two arguments for this analysis. The first argument comes from the absence of superiority effects in *wh*-fronting questions in CSE. Superiority effects in North American English are shown in (21). When there are multiple *wh*-elements in a sentence, only the hierarchically higher element can be fronted, for example, *who* in (21a). Moving the lower *wh*-element across the higher one induces unacceptability, for example, *what* in (21b). This is a general constraint on *wh*-movement based on the hierarchical relation between the two *wh*-elements (see Chomsky 1973, Pesetsky 2000, Richards 2001 among others). The presence of such an effect is considered to be evidence for *wh*-movement of the fronted elements in (21).

(21) (a) Who loves what? No superiority effects induced
(b) *What does who love? Superiority effects induced

Lan (2016) provides the examples in (22) to argue that *wh*-fronting questions in CSE do not show superiority effects. Example (22a) is a baseline sentence where the highest *wh*-element *who* is fronted, predicted to be acceptable. In (22a), *where*, which is base-generated below the subject *who*, is fronted to the sentence-initial position. If the *wh*-fronting question in (22b) involves *wh*-movement of *where*, it is predicted to show superiority effects like (21b). The acceptability of (22b) thus indicates that *where* did not undergo movement across other higher *wh*-elements. The cleft analysis, on the other hand, can account for the lack of superiority effects as is shown in (23): the 'fronted' *where* is base-generated at its surface position, no superiority effects are induced as no movement across a higher *wh*-element occurred.

(22) (a) Who eat what where yesterday ah? (40a in Lan 2016)
(b) Where who eat what yesterday ah? (40d in Lan 2016)
Intended: 'Who ate what where yesterday?'

(23) ~~it is~~ [$_{FocusP}$ where$_1$ [~~that~~ who eat what yesterday OP$_1$]]

The second argument for the cleft analysis comes from the optional *is* at the sentence-initial position of *wh*-fronting questions. Lan (2016) reports the contrast in (24). An optional *is* can appear at the beginning of a *wh*-fronting question (Example 24a) but not a *wh*-in-situ question (Example 24b).

(24) (a) (is) where Charles eat durian yesterday ah? (42b in Lan 2016)
(b) (*is) Charles eat durian where yesterday ah? (42c in Lan 2016)

The cleft analysis can derive this pattern straightforwardly since *wh*-fronting questions are derived from *it*-cleft sentences and the ellipsis of *it*, *is* and *that.* The sentence in (24a) can be derived if only *it* and *that* are deleted and *is* remains as shown in (25). *Wh*-in-situ questions are not derived from cleft sentences in the first place, so the presence of *is* is not grammatical.

(25) ~~It~~ is [$_{FocusP}$ where$_1$ [$_{CP}$ ~~that~~ Charles eat durian yesterday OP$_1$]]?

If the cleft analysis is the only source for *wh*-fronting questions, CSE would be a *wh*-in-situ language like Mandarin Chinese, with a non-*wh*-movement derivation for the *wh*-fronting questions, thus conforming to the generalization from Bobaljik &

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Wurmbrand (2015) that only one *wh*-strategy can be available in any given language. Given these two arguments for the cleft analysis for *wh*-fronting questions, Experiments 2 and 3 test the lack of superiority effects and the availability of sentence-initial *is*, respectively. Note that we test the strong claim that the cleft analysis derives *all* cases of *wh*-fronting questions in CSE, leaving no space for *wh*-movement; rather than the weak position that the cleft analysis and the *wh*-movement analysis are both possible in CSE. We do not aim to exclude the possibility of some *wh*-fronting questions being derived from cleft sentences.

4.2. Experiment 2: Superiority

Experiment 2 tests whether *wh*-fronting questions in CSE show superiority effects. According to the cleft analysis specified above, CSE should not show superiority effects. On the other hand, if *wh*-fronting questions do involve *wh*-movement, superiority effects are predicted.

4.2.1. Design

Experiment 2 includes two factors: (1) WH COUNT, whether the sentence includes one or two *wh*-elements (SINGLE vs. MULTIPLE); (2) WORD ORDER, whether the subject precedes the object or vice versa (SUBJ-OBJ vs. OBJ-SUBJ). A sample of the four conditions is shown in (26). In SINGLE conditions, either the subject or the object is a *wh*-element, while in MULTIPLE conditions, both of them are *wh*-elements. In SUBJ-OBJ conditions, the subject precedes the object, and in OBJ-SUBJ, the object is moved across the subject to produce the object-subject order. Note that in order to keep the sentences simple and closer to the conventional cases of superiority effect, we used subject and object *wh*-questions and not adjunct questions (e.g. *where*).

(26) (a) Who you think order the laksa yesterday ah? SINGLE.SUBJ-OBJ
(b) Who you think order what yesterday ah? MULTIPLE.SUBJ-OBJ
(c) What you think Charles order yesterday ah? SINGLE.OBJ-SUBJ
(d) What you think who order yesterday ah? MULTIPLE.OBJ-SUBJ

Another choice we made is to embed the questions under a matrix clause (*you think* ... in (26)), rather than testing matrix questions shown in (27). This decision was made to make sure that the MULTIPLE.OBJ-SUBJ is not dispreferred due to the two adjacent *wh*-elements at the sentence-initial position (*what who* in (27d)). Note that this partially results from the fact that CSE speakers prefer to drop the auxiliaries in *wh*-questions, (27d) would have been *What did who order yesterday?* in inner circle Englishes.

(27) (a) Who order the laksa yesterday ah? SINGLE.SUBJ-OBJ
(b) Who order what yesterday ah? MULTIPLE.SUBJ-OBJ
(c) What Charles order yesterday ah? SINGLE.OBJ-SUBJ
(d) What who order yesterday ah? MULTIPLE.OBJ-SUBJ

The acceptability difference between SINGLE.SUBJ-OBJ and SINGLE.OBJ-SUBJ (D1) would result from the difference between a subject-fronted question and an object-fronted

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wh-question. The difference between MULTIPLE.SUBJ-OBJ and MULTIPLE.OBJ-SUBJ (D2), both of which are multiple questions, would also include the difference between a subject-fronted question and an object-fronted *wh*-question. Note that the effect of being a multiple-*wh* question would be canceled out, given that both MULTIPLE.SUBJ-OBJ and MULTIPLE.OBJ-SUBJ conditions involve multiple-*wh* questions. If *wh*-fronting is driven by *wh*-movement, the MULTIPLE.OBJ-SUBJ condition involves *what* moving across the higher *wh*-element *who*, which would induce the superiority condition. The MULTIPLE.SUBJ-OBJ condition, although also a multiple *wh*-question, should not induce superiority effects since the fronted *wh*-element is the subject which is base-generated at a higher position than the object. As a result, according to the *wh*-movement analysis, D2 would additionally include the penalty from superiority effects.

If *wh*-fronting questions in CSE do involve *wh*-movement, it would predict (26d) to be ungrammatical, that is, showing superiority effects. Statistical tests should reveal a significant interaction between the two factors: D2 should be larger than D1, as D2 includes superiority effects. If *wh*-fronting questions in CSE do not involve *wh*-movement and the fronted *wh*-elements are base-generated, (26d) should be acceptable. D1 and D2 should be of the same size, as they are both driven by the same factors specified above. No interaction between the two manipulated factors is predicted.

4.2.2. Materials, procedures and participants

Eight lexical combinations were created for each condition, resulting in 32 test items in total. The test items are distributed in a Latin Square design. Each participant saw two items per condition. Each list also includes eight test sentences from Experiment 1 and 12 additional fillers. Experiments 1 and 2 were conducted together, thus the procedure and participants are identical to Experiment 1. Thirty-six CSE speakers finished the experiment. All test items in Experiment 2 end with the sentence-final particle *ah* indicating the question's meaning. The sentence-final particle *ah* was included in order to further make sure that participants are judging the CSE sentences and not inner circle Englishes, as sentence-final particles like *ah* are only allowed in the former.

4.2.3. Results and analyses

Table 5 summarizes the condition means of Experiment 2 in raw judgments on the 7-point scale and transformed z-scores, as well as their standard deviations. Three conditions that do not involve superiority effects (SINGLE.SUBJ-OBJ, SINGLE.OBJ-SUBJ, MULTI.SUBJ-OBJ) are rated above the midpoint of the scale for raw score (4 out of 7) and for z-score (0). The MULTI.OBJ-SUBJ condition is rated below 4 and with a negative z-score.

Table 5. Results from Experiment 2, n = 36.

Condition	Wh count	Order	Judgment	Standard deviation	z-scores	Standard deviation
SINGLE.SUBJ-OBJ	SINGLE	SUBJ-OBJ	6.38	1.67	0.88	0.46
SINGLE.OBJ-SUBJ	SINGLE	OBJ-SUBJ	6.19	1.34	0.78	0.52
MULTI.SUBJ-OBJ	MULTI	SUBJ-OBJ	4.71	1.74	0.077	0.73
MULTI.OBJ-SUBJ	MULTI	OBJ-SUBJ	2.92	1.51	–0.71	0.60

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The condition means in raw ratings and their standard errors are plotted in Figure 5. Figure 6 shows the distribution of condition means by subjects. The difference in judgment between SINGLE.SUBJ-OBJ and SINGLE.OBJ-SUBJ (D1) is 0.19 in raw ratings and 0.1 in z-score. The difference between MULTI.OBJ-SUBJ and MULTI.OBJ-SUBJ conditions (D2) is 1.79 in raw ratings and 0.787 in z-score. D2 is clearly larger than D1. In other words, the MULTI.OBJ-SUBJ condition involves an extra penalty that does not affect the other three conditions.

Figure 5. Condition means of raw judgments of Experiment 2, n = 36.

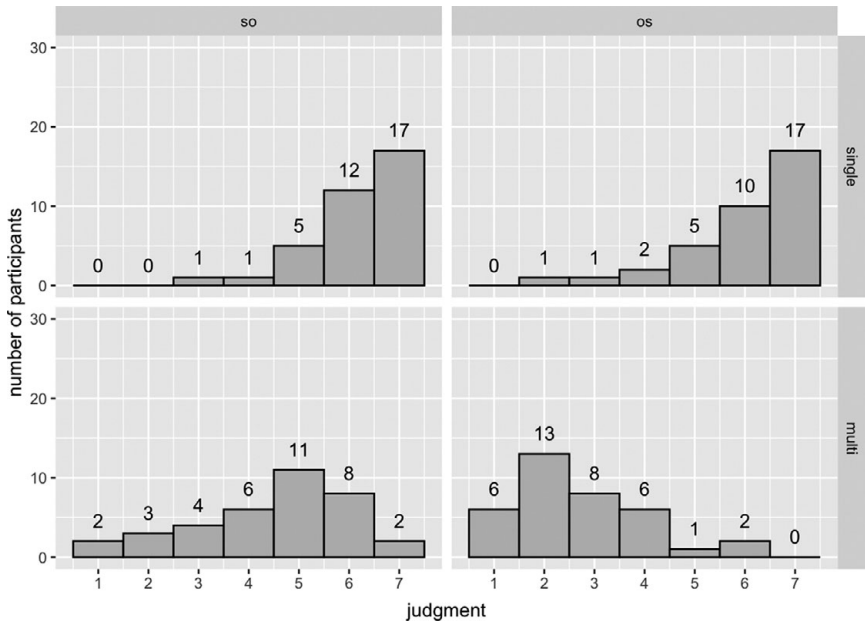

Figure 6. Distribution of raw judgments of Experiment 2, n = 36.

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Table 6. Experiment 2: results from the cumulative link mixed model, judgment ~ order * whCount + (1 + order * whCount | subject) + (1 + order * whCount | lexical).

	Estimate	Standard error	z value	Pr(>|z|)
Order	0.70	0.18	3.84	< .001
whCount	2.36	0.28	8.38	< .0001
order:whCount	–0.69	0.20	–3.48	< .001

We constructed a cumulative link mixed model on raw judgments using WH COUNT and WORD ORDER as fixed factors with items and participants included as random factors. Treatment coding was applied to both fixed factors (single:1, multiple:-1; subj-obj:1, obj-subj:-1). The model revealed a significant main effect of WH COUNT ($p < .0001$): multiple *wh*-questions are rated lower than single *wh*-questions. There was also a significant main effect of WORD ORDER ($p < .001$). Crucially, there is a significant interaction between the two factors ($p < .001$). The results from the statistical tests are summarized in Table 6. The statistically significant interaction indicates that MULTI.OBJ-SUBJ is dispreferred to MULTI.SUBJ-OBJ more than SINGLE.OBJ-SUBJ is dispreferred to SINGLE.SUBJ-OBJ.

The low rating of the MULTI.OBJ-SUBJ condition and the significant interaction between the two factors are compatible with superiority effects in *wh*-fronting questions in CSE. As laid out in the previous section, this is expected under the *wh*-movement analysis for *wh*-fronting questions, as superiority effects result from a constraint on *wh*-movement. The results are not compatible with the cleft analysis, where the fronted *wh*-element is base-generated in its surface position.

4.3. Experiment 3: *is* in *wh*-fronting questions

Experiment 3 tests the other prediction of the cleft analysis: the availability of optional *is* in *wh*-fronting questions. According to the cleft analysis, *wh*-fronting questions in CSE are derived from *it*-cleft sentences with deletion of IT, IS and *that.* Lan (2016) claims that CSE also allows leaving *is* undeleted. This derivation (see 24–25) predicts that *is* can appear in the sentence-initial position in *wh*-fronting questions but not in *wh* in-situ questions.

4.3.1. Design

Experiment 3 includes two factors: WHSTRATEGY (FRONTING VS. IN-SITU) and whether *is* is present (labeled as ISPRESENCE) (PRESENT VS ABSENT). Sample items of the four conditions are shown in (28).

(28) (a) Where Charles eat laska yesterday ah? (FRONTING.ABSENT)
(b) Charles eat laska where yesterday ah? (IN-SITU.ABSENT)
(c) Is where Charles eat laska yesterday ah? (FRONTING.PRESENT)
(d) Is Charles eat laska where yesterday ah? (IN-SITU.PRESENT)

The cleft analysis predicts that the *wh*-fronting question with *is* present (28c) is acceptable while the presence of *is* is incompatible with *wh*-in-situ questions as in (28d). The ABSENCE conditions were included to control for baseline preference between *wh*-fronting and *wh*

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in-situ questions in CSE (see discussion in Experiment 1). The difference between (28a) and (28b) (D1) results from a general preference between these two strategies. If the cleft analysis is on the right track, the difference between (28c) and (28d) (D2) includes this general preference *and* the extra penalty of having an *is* at the beginning of a *wh*-in-situ question. Example (28c) should not be affected by this penalty, as *is* is claimed to be compatible with *wh*-fronting questions. Note that both (28c) and (28d) contain an *is* at the sentence-initial position, thus the general effect of including *is* is canceled out. With this design, the cleft analysis predicts that D2 is larger than D1 since (28a-28c) are grammatical while (28d) is not. Statistically, this would be reflected by a statistically significant interaction of the two factors.

4.3.2. Materials, procedures, participants

Eight lexically matched sets were constructed for each condition, resulting in 32 test items in total. Each participant saw two items per condition (eight test items in total). Each test item is from a different lexically matched set. Each participant also saw 16 filler items.

The participants were asked to judge how natural the sentences were on a 7-point scale, 1 being completely unnatural and 7 being completely natural. The participants were instructed to rate the sentences based on their intuition of CSE. All test items end with a CSE sentence-final particle *ah*. The experiment was conducted on PCIbex (Zehr & Schwarz 2018). Thirty-two self-identified CSE native speakers participated in Experiment 3, with ages ranging from 21 to 35. They were recruited from personal contacts via social media messaging services. Participants were not compensated for participating in Experiment 3.

4.3.3. Results and analyses

The 7-point scale judgments were z-score transformed. The condition means in raw judgments and z-scores are included in Table 7 along with their standard deviations. The condition means of raw judgments and their standard errors are plotted in Figure 7. Figure 8 shows the distribution of condition means by subjects. The results show that the conditions where *is* is present are rated below the midpoint of the scale, while the ABSENT conditions are rated above it. Both *wh*-in-situ and *wh*-fronting questions were judged toward the bottom of the scale in the presence of *is*. This is unexpected if the sentence-initial is is compatible with *wh*-fronting questions as predicted by the cleft analysis.

We constructed a cumulative link mixed model on raw judgments with ISPRESENCE and WHSTRATEGY as fixed factors and with items and participants as random factors. Treatment

Table 7. Results of Experiment 3, n = 32.

	ISPRESENCE	WHSTRATEGY	Judgments	Standard deviation	z-scores	Standard deviation
ABSENT.FRONTING	ABSENT	FRONTING	5.88	1.40	0.70	0.51
ABSENT.IN-SITU	ABSENT	IN-SITU	4.58	2.05	0.15	0.82
PRESENT.FRONTING	PRESENT	FRONTING	2.30	1.89	–0.78	0.71
PRESENT.IN-SITU	PRESENT	IN-SITU	1.86	1.23	–0.98	0.49

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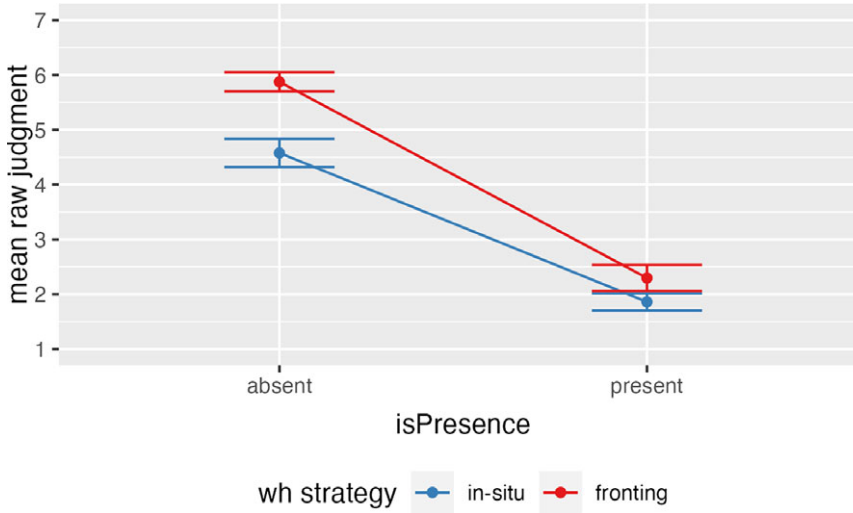

Figure 7. Condition means of raw judgments of Experiment 3, n = 32.

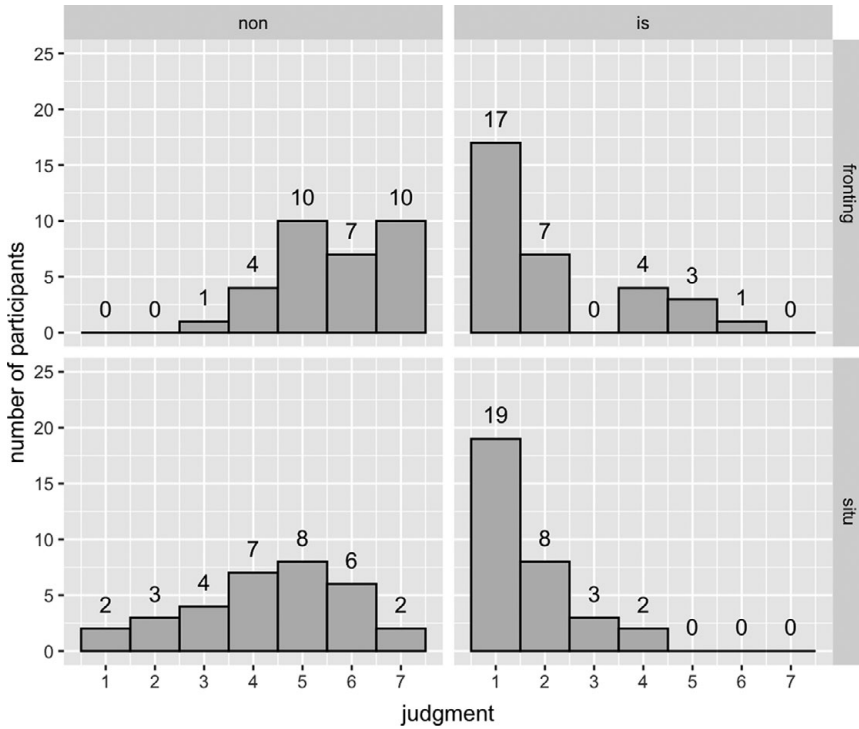

Figure 8. distribution of raw judgments of Experiment 3, n = 32.

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Table 8. Formula: Experiment 3 results, formula: judgment ~ isPresence * whStrategy + (1 + isPresence | subject) + (1 + isPresence * whStrategy | lexical).

	Estimate	Standard error	z value	Pr(>|z|)
isPresence	2.23	0.33	6.68	< .0001
whStrategy	0.50	0.28	1.80	0.07
isPresence:whStrategy	0.19	0.19	1.03	0.30

coding was applied to both fixed factors (absent:1, present:-1; move:1, situ:-1). We started with a model that included all random slopes, but due to a failure to converge, the random effects structure was simplified until the largest converging model was achieved (see Table 8 for the final model). The results from the statistical tests are summarized in Table 8. The model revealed a significant main effect of ISPRESENCE ($p < 0.0001$), conditions with *is* are rated worse than the ones without. There is a marginal main effect of WHSTRATEGY ($p = 0.07$). There is no interaction between the two factors ($p = 0.30$).

Results from Experiment 3 show that for most of the participants, the presence of *is* makes both *wh*-fronting and *wh*-in-situ questions unacceptable. The predicted interaction of the two factors by the cleft analysis is not observed. The size of the penalty of including *is* at the beginning of questions is not smaller for *wh*-fronting. In fact, the effect of *is* is numerically larger for *wh*-fronting questions (3.58 in raw judgment) than for *wh*-in-situ questions (2.72 in raw judgment). This is the *opposite* of what the cleft analysis predicts and could result from the fact that *wh*-fronting questions with no *is* are rated higher than *wh*-in-situ questions. On the other hand, the *wh*-movement analysis would account for the effect of *is*: neither *wh*-in-situ nor *wh*-fronting questions are derived from *it*-clefts, thus *is* is never generated at the question initial position.

We note that Figure 8 shows a bimodal distribution for the FRONTING.PRESENT condition where eight out of the 32 participants rated the condition between 4 and 6 while the rest of the participants rated it at the bottom of the scale. This pattern indicates that for a small portion of participants, the sentence-initial *is* is acceptable in *wh*-fronting questions. Given the consistently low ratings for the IN-SITU.PRESENT condition, these eight participants did show a preference for *fronting.present* sentences, as predicted by the cleft analysis for *wh*-fronting questions. Thus, we leave open the possibility that a portion of CSE speakers can assign a cleft structure to *wh*-fronting questions. However, this possibility is compatible with our claim that *wh*-movement exists in CSE, as the existence of *wh*-movement does not exclude the possibility of some *wh*-fronting questions being derived from cleft sentences. Crucially, the majority of our participants rated the FRONTING.PRESENT condition at the bottom of the scale, which indicates these participants did not assign the cleft analysis to the *wh*-fronting questions. In other words, the cleft analysis cannot be the only source for *wh*-fronting questions in CSE. Thus, we maintain our conclusion that for CSE speakers, *wh*-fronting questions can involve *wh*-movement.

Combining Experiments 2 and 3, we can see that for most participants, neither of the arguments for the cleft analysis is verified in CSE. On the other hand, results from both experiments are consistent with the *wh*-movement analysis for *wh*-fronting questions, especially the presence of superiority effects in Experiment 2. Moreover, the distribution

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of the judgments from these experiments indicates that *wh*-movement is the primary source for *wh*-fronting questions in CSE.

Since the cleft analysis of *wh*-fronting questions has been proposed for Malay and Bahasa Indonesia (Cheng 1991), arguing against this analysis as the primary source for CSE *wh*-fronting questions corroborates with the view that vernacular varieties of Malay are not primary substrates of CSE (see Sato 2013). Instead, *wh*-fronting questions and *wh*-in-situ questions rise under the grammatical pressure from inner circle Englishes and Chinese.

A reviewer observed that sentences in the ABSENT conditions in Experiment 3 are different from the MATRIX conditions in Experiment 1 in that the former used *where* and the latter used *what* as the *wh*-elements. Examples of the relevant conditions and their mean ratings are repeated below in (29). The reviewer pointed out that there seems to be a penalty in embedded in-situ questions with *where*: (29b) is rated lower than (29a), but no difference is observed in (29c–29d). Another reviewer reported, based on their own judgments in CSE, that 'Yesterday Charles eat laksa where ah?' or 'Charles eat laksa where ah?' sound better than (29b) and suggests semantic/pragmatic effects at play here.

(29) (a) Where Charles eat laska yesterday ah? (Experiment 3 FRONTING.ABSENT, mean rating: 5.88)
(b) Charles eat laska where yesterday ah? (Experiment 3 IN-SITU.ABSENT, mean rating: 4.58)
(c) What Sarah cook for dinner last week? (MOVE.MATRIX, mean rating: 6.44)
(d) Sarah cook what for dinner last week? (IN-SITU.MATRIX, mean rating: 6.40)

We note the observations but want to highlight that the 'where' was chosen to stay close to the original claim by Lan (2016), who used questions with 'where' (see (24)). While a potential penalty on in-situ questions in (29b) is intriguing in its own right, we do not think it would compromise our conclusion in Experiment 3. The cleft analysis predicts that *wh*-fronting questions with a sentence-initial *is* are acceptable, and our results show that FRONTING.PRESENT was rated at the bottom of the scale and clearly lower than the FRONTING.ABSENT condition.

5. General discussion

Experiment 1 shows that both *wh*-in-situ and *wh*-fronting questions can be embedded under question-selecting predicates in CSE. This result indicates that declarative syntax questions cannot be the sole source of *wh*-in-situ questions in CSE. 'True' *wh*-in-situ questions, derived either by unselective binding or covert movement, are available in CSE as they are in languages like Mandarin Chinese.[4] Experiment 2 verifies the presence of superiority effects in *wh*-fronting questions in CSE, and Experiment 3 shows that the presence of *is* at the beginning of questions is generally unacceptable in CSE, challenging the cleft analysis for the *wh*-fronting questions. Both Experiments 2 and 3 point to the presence of *wh*-movement in CSE.

Taking these results together, both 'true' *wh*-in-situ and *wh*-movement questions exist in CSE, as the alternative analyses proposed in the literature are not supported (Lan 2016,

[4] Experiment 1 did not tease apart different structural analyses of 'true' *wh*-in-situ questions in CSE. Sato & Ngui (2017) claim that *wh*-in-situ questions in CSE do not show island sensitivity, which indicates an unselective binding analysis rather than the covert movement analysis.

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Chang 2016). This makes CSE a language that is at odds with the generalization that each language can only allow one *wh*-strategy proposed in Bobaljik & Wurmbrand (2015). As mentioned in Section 3, Sato & Ngui (2017) argued that CSE allows both 'true' *wh*-fronting and *wh*-in-situ questions as well, based on their survey on DSQ. However, Sato & Ngui (2017) did not address the cleft analysis (Lan 2016), and their methodology suffers from the same confound as Chang (2016). The current paper uses more controlled experimental designs to verify the empirical claims and predictions generated by the theories under debate. As mentioned in Section 1, the existence of languages like CSE presents a counterexample to the DSQ/*wh*-in-situ generalization in Example (9). To accommodate languages that allow both *wh*-strategies is rather straightforward. Sato & Ngui (2017) propose that two variants of the C head are present in such languages, one with a strong Q feature ($C_{[+Qs]}$ in (30a)) which would require *wh*-movement of the *wh*-element to the SpecCP position, and one with a weak Q feature ($C_{[+Qw]}$ in (30b)), which does not trigger *wh*-movement, and binds the *wh*-element in-situ instead (see also Cole & Hermon 1998 for a system proposed for Malay). There is no a priori reason to assume that the two versions of C heads cannot exist in the same language. Intuitively, having both variants in one language does not pose difficulties for acquisition either, as the positive evidence of *wh*-fronting and *wh*-in-situ questions are readily available in the input.

(30) (a) $[_{CP}$ What$_i$ $C_{[+Qs]}$ $[_{TP}$ Mary eat t$_i$ ah?]] *wh*-movement
(b) $[_{CP}$ $C_{[+Qwi]}$ $[_{TP}$ Mary eat what$_i$ ah?]] *wh*-in-situ as unselective binding

It is important to note that although this paper argues that *wh*-optionality between *wh*-movement and true *wh*-in-situ exists, it does not necessarily mean that the two operations are in free variation. It is an open question whether *wh*-movement and *wh*-in-situ questions have different pragmatic or semantic effects and are preferred in different contexts, even though both strategies are derived with the help of a $C_{[+Q]}$ head. Probing such intricate differences among *wh*-strategies is beyond the scope of this paper.[5]

In terms of methodology, this paper presents an example of applying experimental syntax methods to contact and colloquial languages. Contact and colloquial languages like CSE are often reported to involve a considerable amount of speaker variation, which is why previous studies established their empirical claims with surveys with dozens of speakers, instead of relying on the authors' own judgments. However, increasing the number of speakers itself does not guarantee more reliable data if the design is confounded. Using factorial designs for embedded questions, superiority effects and the presence of *is* in our experiments limits the space for confounding factors, thus lending more confidence in the empirical claims than the previous literature.

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Data availability statement. The stimuli, data for the test and filler items, and analyses for the four experiments reported in this paper can be found here: https://osf.io/fknbx/?view_only=c90ccb94b7d9418abcd727305019c72d

[5] For example, Lee (2022) proposes that *wh*-in-situ and *wh*-fronting questions in CSE are semantically distinct in that *wh*-fronting questions are obligatorily mention-all questions, and *wh*-in-situ questions are mention-some questions as a conversational implicature. However, Lee's (2022) particular formulation also predicts that *wh*-fronting questions in CSE do not show superiority effects (see the discussion around his (20)), which Experiment 2 in this paper falsifies. I will leave experimentally verifying other empirical claims involved in this analysis to future research.

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