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

Rachel Tan and Zheng Shen

National University of Singapore

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 argue that only one strategy is truly available in any given language. Cheng (1991) and Faure and Palasis 2021 argue that *wh*-fronting lnaguages in Indonesian and Colloquial French are not derived by *wh*-movement while Chang (2016) argues that wh-in situ questions in Colloquial Singapore English are not derived from unselective binding or LF movement, but are declarative syntax questions. Bobaljik and 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 Colloquial Singapore English (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 show that the patterns are best accounted for if both 'true' *wh*-movement and 'true' *wh*-in-situ questions exist in CSE, thus challenging the previous analyses for CSE, and the cross-linguistic generalization in Bobaljik and Wurmbrand 2015 (see also Sato and Ngui 2017).

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 (1), hereinforth labeled as *wh*-fronting. The classic syntactic approach to *wh*-fronting involves wh-movement of the wh-element to Spec,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, hereinforth labeled as *wh*-in-situ. Languages including Mandarin Chinese and some varieties of English, e.g. 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, i.e. the object of the verb. On the other hand, the unselective binding analysis (Pesetsky 1987; Tsai 1994 among many 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 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 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 and Hermon 1998). Faure and Palasis (2021) argue that Colloquial French is a wh-in situ language, and movement of wh-item in its wh-fronting questions is not triggerd by a Question operator but rather an Exclusivity operator. From the other direction, Bobaljik and 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 and 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 and Wurmbrand 2015, ex. 2)

Although (5) might be perceived as English allowing both strategies, Bobaljik and 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 and 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. 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 and Wurmbrand 2015, languages that pattern with English include German, Dutch, Icelandic, American Sign Language, Brazilian and European Portuguese; while Turkish, Chinese, Japanese are true wh-in situ lanaguges.

(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)

Bobaljik and 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 Spec,CP), 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 and Wurmbrand 2015, ex1)

If the generalization in (9) is on the right track, languages which 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). Indosenian (following Cheng 1991) and Colloquial French (following Faure and 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 and wh-in situ questions that can be embedded under question-selecting predicates. This paper argues that Colloquial Singapore English 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 and 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 are correct, CSE would conform to the generalization in (9).

This paper uses methods from experimental syntax and show that predictions from the two alternative analyses for *wh*-questions in CSE are not borne out. This indicates that CSE indeed allow 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 greater degree of individual variation. While previous studies in CSE have utilized methods from experimental syntax (Chang 2016; Sato and 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

Colloquial Singapore English (CSE), also known as Singlish, is a contact language with a dominant English lexifier and 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 B&W'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); Zhiming (2001); Kim (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 'standard 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, i.e. languages that only allows *wh*-in-situ and not *wh*-fronting questions.

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 *wh*-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 argue 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 (DSQ) 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 and Sag 2000; Bobaljik and Wurmbrand 2015), shown in (11).

(11) Bobaljik and 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 and 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 and Wurmbrand 2015, ex.8

a. *He asked me your boy's name is what.

b. *I wonder I should put this stuff where.

Imporantly, *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 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 and Wurmbrand (2015) propose that the questions in (11) have a different structure from the 'true' *wh*-in-situ questions in (13). The question predicate select a CP that's specified as [+Q]. The incompatibility 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 Colloquial Singapore English 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 and 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 and Ngui (2017) argue that CSE falsifies the cross-linguistic generalization from Bobaljik and Wurmbrand (2015), contra Chang 2016.[1]

(15) ex. 13-15 in Sato and Ngui 2017

[1]The current paper will eventually reach the same conclusion as Sato and 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 and 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 and Ngui (2017) suffer from; 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 and 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 and 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 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 and 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 and 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

Design Exp. 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 are 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 question with an extra PP 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).

Materials, procedures, and participants 8 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 8 test sentences from Experiment 2 and 12 additional fillers. The experiment was conducted on PCIbex (Zehr and Schwarz 2018) where each participant was asked to rate the acceptability of the sentences on a 7 point Likert scale. 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 (16) which is allowed in CSE but not standard inner circle Englishes. 36 participants finished the experiment, all of whom were aged from 21 to 30, grew up in Singapore and use Singlish on a daily basis. Each participant was compensated with 5 SGD for participation.

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, all are above 0.6 in z-scores. This indicates that all four conditions are accepted, including the IN-SITU.EMBEDDED condition that the DSQ approach predicts to be unacceptable.

We constructed a cumulative link mixed model on raw judgments using EMBEDDING and WH-

conditions	EMBEDDING	WHSTRATEGY	judgments	sd	z-scores	sd
MOVE.MATRIX	MATRIX	MOVE	6.44	1.01	0.90	0.47
SITU.MATRIX	MATRIX	SITU	6.40	0.93	0.87	0.38
MOVE.EMBEDDED	EMBEDDED	MOVE	6.38	1.07	0.84	0.41
SITU.EMBEDDED	EMBEDDED	SITU	5.96	1.18	0.66	0.55

Table 1: Results from Experiment 1, n = 36

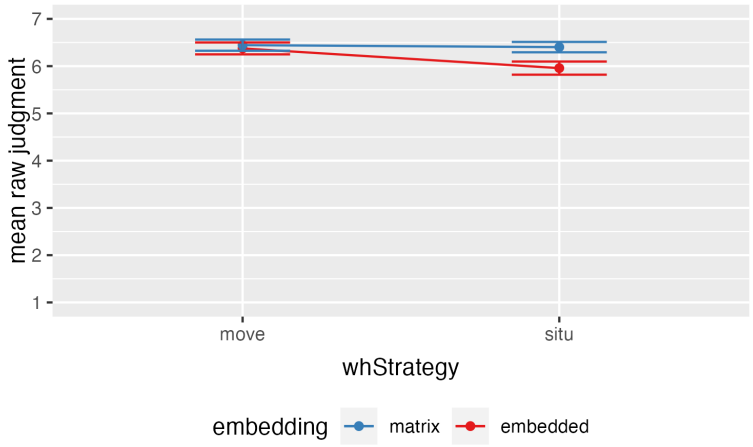

Figure 1: condition means of raw judgment of Exp 1, n = 36

STRATEGY as fixed factors and items and participants included as random factors. It revealed no main effects of EMBEDDING ($p = 0.89$) or WHSTRATEGY ($p = 0.66$). There is also no interaction between the two conditions ($p = 0.17$). The results are summarized in Table 2.[2]

	Estimate	Std. Error	z value	Pr(>|z|)
embedding	-0.09	0.61	-0.15	0.89
whStrategy	-0.24	0.54	-0.44	0.66
embedding:whStrategy	-1.16	0.84	-1.38	0.17

Table 2: results from the cumulative link mixed model, formula: judgment $\sim$ embedding * whStrategy + (1 + embedding * whStrategy | subject) + (1 + embedding * whStrategy | lexical)

Given the high condition mean of the IN-SITU.EMBEDDED condition and the lack of interaction

[2]We also constructed linear mixed effect models based on z-scores for Experiments 1-3. They did not reveal different results from the cumulative link mixed models, thus we report the models based on the raw judgmens for ease of interpretation.

between the two factors from the statistical tests, results from Exp 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 DSQ analysis cannot be the only source for *wh*-in-situ questions in CSE, *not* that DSQs do not exist in CSE. Having shown that true wh-in situ questions exist in CSE, Experiments 2 and 3 will show that wh-movement also 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 Spec,CP headed by a C with [+Q]. A sample derivation is shown in (17), where the *wh*-element moves from its base-generated position (object of the verb) to the Spec,CP position.

(17) $[_{CP}$ What$_1$ C$_{[+Q]}$ did Mary 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 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 Spec,FocusP as is shown in (18). 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.

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

Lan (2016) provides two arguments for this analysis. The first argument comes from the absence of the superiority effect in *wh*-fronting questions in CSE. The superiority effect in North American English is shown in (19). When there are multiple *wh*-elements in a sentence, only the hierarchically higher element can be fronted, e.g.: *who* in (19a). Moving the lower *wh*-element across the higher one induces unacceptability, e.g. *what* in (19b). 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 effect is considered to be evidence for *wh*-movement of the fronted elements in (19).

(19) a. Who loves what?

b. *What does who love? superiority effect

Lan (2016) provides the examples in (20) to argue that *wh*-fronting questions in CSE do not show

the superiority effect. (20a) is a baseline sentence where the highest *wh*-element *who* is fronted, predicted to be acceptable. In (20b), *where*, which is base-generated below the subject *who*, is fronted to the sentence initial position. If the *wh*-fronting question in (20b) involves *wh*-movement of *where*, it is predicted to show the superiority effect like (19b). The acceptability of (20b) 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 effect as is shown in (21): the 'fronted' *where* is base-generated at its surface position, no superiority effect is induced as no movement across higher *wh*-element occurred.

(20) 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?'

(21) ~~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 (22). An optional *is* can appear at the beginning of a *wh*-fronting question (22a), but not a *wh*-in-situ question (22b).

(22) 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 (22a) can be derived if

only *it* and *that* are deleted and *is* remains as shown in (23). *Wh*-in-situ questions are not derived from cleft sentences in the first place, so the presence of *is* is not grammatical.

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

If the cleft analysis is on the right track, 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 and 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 effect and the availability of *is* respectively.

4.2 Exp 2: Superiority

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

Design Exp 2 includes two factors: 1. WH COUNT, whether the sentence include 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 are shown in (24). 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*).

(24) 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 (24)), rather than testing matrix questions shown in (25). 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 (25d)). Note that this partially results from the fact that CSE speakers prefer to drop the auxiliaries in *wh*-questions, (25d) would have been *What did who order yesterday?* in inner circle Englishes.

(25) 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 *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 the superiority effect 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 the superiority effect.

If *wh*-fronting questions in CSE do involve *wh*-movement, it would predict (24d) to be ungrammatical, i.e. showing the superiority effect. Statistical tests should reveal a significant interaction between the two factors: D2 should be larger than D1 as D2 includes the superiority effect. If *wh*-fronting questions in CSE do not involve *wh*-movement and the fronted *wh*-elements are base-generated, (24d) 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.

Materials, procedures, and participants 8 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 8 test sentences from Experiment 1 and 12 additional fillers. Experiments 1 and 2 are conducted together, thus the procedure and participants are identical to Experiment 1. 36 CSE speakers finished the experiment. All test items in Experiment 2 end with the sentence final particle *ah* indicating the question meaning. *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.

Results and analyses Table 3 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 con-

ditions that do not involve superiority effect (SINGLE.SUBJ-OBJ, SINGLE.OBJ-SUBJ, MULTI.SUBJ-OBJ) are rated above the mid-point of the scale for raw scare (4 out of 7) and for z-score (0). The MULTI.OBJ-SUBJ condition is rated below 4 and with a negative z-score, which indicates that it is not accepted.

condition	WH COUNT	ORDER	judgment	sd	z-scores	sd
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

Table 3: Results from Experiment 2, n = 36

The condition means in raw ratings and their standard errors are plotted in Figure 2. 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 seems to involve an extra penalty that does not affect the other three conditions.

Figure 2: condition means of raw judgments of Exp 2, n = 36

We constructed a cumulative link mixed model on raw judgments with items and participants

included as random factors using WH COUNT and WORD ORDER as fixed factors. It revealed a significant main effect of WH COUNT ($p < 0.0001$): multiple *wh*-questions are rated lower than single *wh*-questions. No main effect of WORD ORDER was revealed ($p = 0.96$). Crucially, there is a significant interaction between the two factors ($p < 0.001$). The results from the statistical tests are summarized in Table 4. 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.

	Estimate	Std. Error	z value	Pr(>|z|)	
order	-0.02512	0.554	-0.045	0.963838	
whCount	-3.35454	0.59631	-5.625	1.85E-08	***
order:whCount	-2.74572	0.78816	-3.484	0.000494	***

Table 4: Experiment 2: results from the cumulative link mixed model, judgment $\sim$ order * whCount + (1 + order * whCount | subject) + (1 + order * whCount | lexical)

The low rating of the MULTI.OBJ-SUBJ condition and the significant interaction between the two factors are compatible with the superiority effect 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 effect is 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 Exp 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 sentence with deletion of *it*, *is*, and *that*. Lan (2016) claims that CSE also allows leaving *is* undeleted. This derivation (see (22)-(23)) predicts that *is* can appear in the sentence initial position in *wh*-fronting questions but not in wh in-situ questions.

Design Exp 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 (26).

(26) 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 (26c) is acceptable while the presence of *is* is incompatible with wh in-situ questions as in (26d). The ABSENCE conditions were included to control for baseline preference between *wh*-fronting and wh in-situ questions in CSE (see discussion in Exp. 1). The difference between (26a) and (26b) (D1) results from a general preference between these two strategies. If the cleft analysis is on the right track, the difference between (26c) and (26d) (D2) includes this general preference *and* the extra penalty of having an *is* at the beginning of a *wh*-in-situ question. (26c) should not be affected by this penalty as *is* is claimed to be compatible with *wh*-fronting questions. Note that both (26c) and (26d) 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 (26a-c) are grammatical while (26d) is not. Statistically, this would be reflected by a statistically significant interaction of the two factors.

Materials, procedures, participants 8 lexically matched sets were constructed for each condition, resulting in 32 test items in total. Each participant saw 2 items per condition (8 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 are on a 7 point scale, 1 being very unnatural and 7 being very 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 and Schwarz 2018). 32 self-identified CSE native speakers participated in Exp 3, with age ranging from 21 to 35. They were recruited from personal contacts via social media messaging services. Participants were not compensated for participating Exp 3.

Results and analyses The 7 point scale judgments were z-score transformed. The condition means in raw judgment and z-score are include in Table 5 along with their standard deviations. The condition means in z-score and their standard errors are plotted in Figure 3. The results show that the conditions where *is* is present are rated below the mid point 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 presence of *is*. This is unexpected if the sentence initial *is* is compatible with *wh*-fronting questions as predicted by the cleft analysis.

	ISPRESENCE	WHSTRATEGY	judgments	sd	z-scores	sd
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

Table 5: results of Exp 3, n = 32

We constructed a cumulative link mixed model on raw judgments with ISPRESENCE and WH-STRATEGY as fixed factors and with items and participants as random factors. We started with a

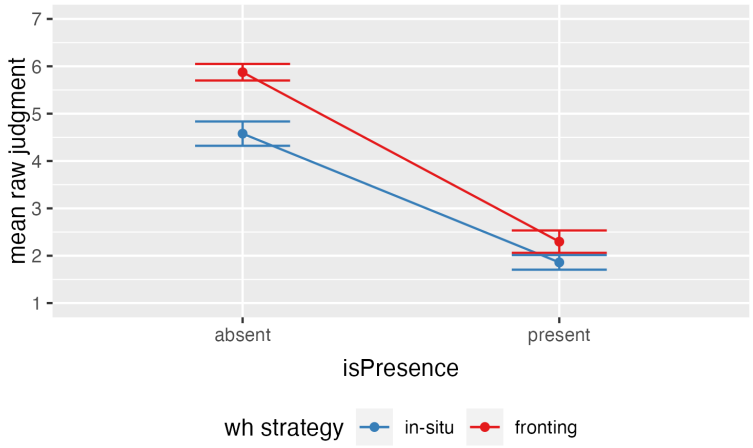

Figure 3: condition means of raw judgments of Exp 3, n = 32

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 6 for the final model. It revealed a significant main effect of ISPRESENCE ($p < 0.0001$), conditions with *is* are rated worse than the ones without. There is also a significant main effect of WHSTRATEGY ($p < 0.01$), *wh*-in-situ conditions are rated worse than *wh*-fronting ones. There is no interaction between the two factors ($p = 0.31$). The results from the statistical tests are summarized in Table 6.

	Estimate	Std. Error	z value	Pr(>|z|)	
isPresence	-4.85	0.80	-6.09	1.11E-09	***
whStrategy	-1.38	0.51	-2.72	0.01	**
isPresence:whStrategy	0.76	0.75	1.02	0.31	

Table 6: formula: Experiment 3 results, formula: judgment ∼ isPresence * whStrategy + (1 + isPresence | subject) + (1 + isPresence * whStrategy | lexical)

Results from Exp 3 show that the presence of *is* makes both *wh*-fronting and *wh*-in-situ questions unacceptable. The size of 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. On the other hand, *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.

Combining Exp 2 and Exp 3 together, we can see that neither of the arguments for the cleft analysis is verified in CSE. On the other hand, both results are consistent with the *wh*-movement analysis for *wh*-fronting questions, especially the presence of the superiority effect in Exp 2. These results thus support the presence of *wh*-movement analysis in CSE.

Since the cleft analysis of wh-fronting questions has been proposed for Malay and Bahasa Indonesia (Cheng 1991), arguing against this analysis for CSE 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 the Chinese and English.

5 General discussion

In sum, 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 the 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. Experiment 2 verifies the presence of superiority effect in *wh*-fronting questions in CSE and Experiment 3 shows that the presence of *is* at the beginning of questions is unacceptable in CSE, contrary to 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; 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 and Wurmbrand 2015. As mentioned in Section 3, Sato and 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 and 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 existance of languages like CSE presents an counterexample to the DSQ/wh-in situ generalization in (9). To accommodate languages that allow both *wh*-strategies is rather straight forward. Sato and Ngui (2017) propose that two variants of C head are present in such languages, one with a strong Q feature (C_{+Qs} in (27a)) which would require *wh*-movement of the *wh*-element to the Spec,CP position, and one with a weak Q feature (C_{+Qw} in (27b)) which do not trigger *wh*-movement, and binds the *wh*-element in-situ instead (see also Cole and 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.

(27) a. $[_{CP}$ What$_i$ C_{+Qs} Mary eat t$_i$ ah?] wh-movement

b. $[_{CP}$ C_{+Qwi} 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.[3]

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 support 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 factoria designs for embedded questions, superiority effect, and the presence of *is* in our experiments limits space for confounding factors, thus lending more confidence in the empirical claims than the previous literature.

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[3]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 question as a conversational implicature. However, Lee (2022)'s partcipular formulation also predicts that wh-fronting questions in CSE do not show superiority effect (ex. 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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