Finiteness in a language without finite morphology: an experimental study of Mandarin Chinese

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Abstract

A theme in research on finiteness suggests that finiteness is an abstract formal property of clauses that can be found across languages, even though languages might differ in how finiteness is realized morphosyntactically. This article considers these issues from the perspective of Mandarin Chinese, where there are competing claims over whether the language makes a finiteness distinction, and if it does, whether the complement clauses of control verbs, which are hypothesized to be nonfinite, can exceptionally license overt controlee subjects. In order to evaluate these competing claims, two acceptability judgment experiments were conducted to validate previously-reported examples of overt controlee subjects felicitously appearing inside control complements in Mandarin.

The experiments reveal that these examples are not as acceptable as they are sometimes claimed to be, corroborating concerns occasionally raised about these examples. First, native speakers agree that null subjects can appear inside control complements, but show substantially more variability over whether overt controlee subjects can do so. Second, at an aggregate level, the presence of overt subjects reduced acceptability to a greater extent in control complements than in the complement clauses of belief verbs, like "think" and "say." These results suggest that control and belief verbs have different subcategorization properties, and also bear on these competing accounts about finiteness. In particular, I note that these results can be understood rather straightforwardly under accounts in which Mandarin has a "classical" finiteness distinction like many languages with richer morphology, where control verbs take nonfinite complement clauses that do not license overt subjects.

Keywords

Finiteness, control verbs, null subjects, experimental syntax, cross-linguistic variation, Chinese

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1 Introduction

The notion of finiteness plays important roles in syntactic research, such as theories of locality (Chomsky 1973; Chomsky 1977), case (e.g. Chomsky 1981), and clausal architecture (Rizzi 1997; Cinque 1999; 2006; Wurmbrand 2001; Wurmbrand and Lohninger 2019). However, exactly what finiteness is is perhaps less well understood, due to the fact that languages vary substantially in their morphosyntax. Although finiteness is traditionally associated with certain kinds of verbal morphology, more recent research has suggested that finiteness might be more fruitfully thought of as an abstract formal property of clauses (for discussion and references, see e.g. Nikolaeva 2007; 2010; McFadden and Sundaresan 2014; Wurmbrand and Lohninger 2019). In this view, languages have some flexibility in how they encode finiteness. Depending on the language, the hallmarks of finite clauses (but not nonfinite clauses) might take the form of tense, agreement and/or mood morphology, complementizers, word order, and so on.

A further prediction following from this view is that a finiteness distinction can be found even in languages with minimal verbal morphology. This article considers this prediction from one such language – Mandarin Chinese – where there has been much debate over what the basic facts are and how they should be interpreted. Various influential proposals have claimed that Mandarin makes a finiteness distinction (e.g. C.-T. J. Huang 1982; 1989; Y.-H. A. Li 1985; 1990). A key piece of evidence offered is that overt subjects cannot appear in the clausal complements of Mandarin control verbs, which are assumed to be nonfinite, as is the case in many languages with richer morphology, and consistent with mainstream syntactic theories that hold that nonfinite clauses cannot license overt subjects. However, counterexamples with overt subjects have been presented, in support of the opposing claim that Mandarin lacks a finiteness distinction (Hu, Pan, and Xu 2001; Xu 2003; also Y. Huang 1994). These counterexamples have also been argued to show that Mandarin makes a finiteness distinction where nonfinite clauses exceptionally allow overt controlee subjects, as reported for languages like Hungarian, Korean, Romance, Tamil, and Zapotec (Zhang 2016 and references therein).

This article assesses these competing claims about Mandarin from an experimental syntax perspective. I present two acceptability judgment experiments showing that the counterexamples with overt subjects are not as acceptable as are sometimes presented. These results validate concerns occasionally raised in passing about the acceptability of these counterexamples. More importantly, as I elaborate below, these results can be seen as novel experimental support for the classical claim that Mandarin Chinese has a finiteness distinction typical of many languages with richer morphology, where nonfinite clauses cannot license overt subjects. In this regard, the results sharpen our understanding of the range of cross-linguistic variation in the encoding of finiteness.

This article is organized as follows. Section 2 reviews prior work on finiteness in Mandarin, paying particular attention to claims about the distribution of overt subjects; Section 3 describes the experiments; Section 4 presents a general discussion and Section 5 concludes.

2 Finiteness and subjects in Mandarin Chinese

The distribution of overt and null subjects has long occupied a prominent place in discussions about finiteness, especially in the context of Mandarin Chinese. One reason is the fact that mainstream generative theories have consistently linked the distribution of overt subjects to finiteness. For instance, under Government and Binding proposals, overt NP subjects are said to need (abstract) Case, licensed by finite but not nonfinite INFL (e.g. Chomsky 1981). Although current theorizing has moved away from the notion of government, more recent proposals continue to share the intuition that nonfinite INFL (or T) cannot license case in overt subjects (e.g. Chomsky and Lasnik 1993; Hornstein 1999; Martin 2001, among many others, but see Landau 2004; 2015 for non-case perspectives). A closely-related second reason why this distribution has received much attention is the robust cross-linguistic correlation between overt subjects and (non)finiteness: in many languages, the complement clauses of control verbs are typically non-finite and cannot host overt subjects. (Granted, exceptions exist. Languages like Korean, Hungarian, etc. are said

to allow overt controlee pronouns as subjects in nonfinite control complements, while Latin, German, and English have an *accusativus cum infinitivo* construction / exceptional case-marking for certain verbs.)

For these reasons, the distribution of overt and null subjects is a cross-linguistically important diagnostic for (non)finiteness, especially for languages with relatively simple verbal morphology. This is also the case in the Chinese context, even though researchers working on Chinese have identified many other phenomena as potentially diagnosing (non)finiteness, such as the distribution and interpretation of future and aspect markers, sentence-final particles, the reflexive *ziji*, and topicalization/fronting phenomena (C.-T. J. Huang 1989; Y.-H. A. Li 1990; Paul 2002; Lin 2012; Grano 2015; Ussery et al. 2016; N. Huang 2015; 2018; Zhang 2019; Liu, to appear, among many others, and see He 2020; C.-T. J. Huang 2022 for recent overviews). These diagnostics certainly provide rich evidence for a distinction within complement clauses, but they are typically Mandarin-specific and so do not show as easily that the distinction is the finiteness distinction found in other languages.

Having provided some background on why the distribution of subjects bears on the issue of finiteness, I next review three prominent accounts that have been proposed for Mandarin.

2.1 The "classical" account

This account, which can be traced to discussions in C.-T. J. Huang 1982; 1989; Y.-H. A. Li 1985; 1990, claims that Mandarin makes a finiteness distinction, such that nonfinite clauses cannot license overt subjects, as expected under classical generative theories about finiteness. A key piece of evidence cited in this account is the contrast in (1). This contrast is explained by positing that (i) Mandarin control complements are nonfinite, just like control complements in many other languages, and (ii) nonfinite INFL (or AUX, T) in Mandarin cannot license overt subjects.

(1) Lisi shefa (*ta) lai.
Lisi try 3SG come
"Lisi tried to come." (C.-T. J. Huang 1989:189-190, ex. 9a, 14)[1]

As mentioned above, these accounts also present other evidence for a finiteness distinction. While the evidence discussed is often Mandarin-specific, one piece of evidence is not: the fact that Mandarin control complements do not allow a full range of modals, future, and aspect markers (2) (e.g. C.-T. J. Huang 1989; Y.-H. A. Li 1990; Lin 2012; N. Huang 2015). This is another cross-linguistically robust hallmark of nonfiniteness. However, it is less clear whether this is truly a morphosyntactic restriction. As Hu et al. (2001:1124) note, it is possible that there is nothing morphosyntactically inappropriate about modals and aspect markers inside control complements. Rather, these markers might have semantics that are incompatible with control verbs. In contrast, the absence of overt subjects is harder to attribute to semantics. The null subject of a nonfinite clause is interpreted like a bound pronoun. To the extent that a control complement cannot even host an overt bound pronoun subject, it suggests that the constraint on overt subjects is morphosyntactic in nature.

(2) Lisi shefa (*hui/*neng) lai.
Lisi try will can come
Intended: "Lisi tried to come." (C.-T. J. Huang 1989:189, ex. 9a, b)

2.2 The "uniform complementation" account

Hu et al. (2001), in a critique of classical accounts, present various arguments and counterexamples in support of the opposing view that Mandarin lacks a finiteness distinction. One notable argument involves examples like (3) and (4), where the control verb has a complement clause with an overt pronoun subject, and an intervening adverbial phrase. Hu et al. use these examples, which they report as acceptable, to argue

[1] Glosses follow the Leipzig glossing conventions: 3SG = third person singular pronoun; CLF = classifier; PFV = perfective aspect.

that both control verbs and belief verbs (e.g. *renwei* "think," which take finite complement clauses under classical accounts) allow complement clauses with overt subjects, and therefore Mandarin does not make a finiteness distinction (also see Y. Huang 1994 for the conceptually-similar claim Mandarin has only finite clauses). I will therefore call this the "uniform complementation" account.

(3) Ni zuihao shefa [[jintian xiawu san-le hui yihou] ni yi ge ren lai].
you had.better try today afternoon end-PFV meeting after you one CLFperson come
"You had better try to come by yourself this afternoon after the meeting has ended." (Hu et al. 2001:1131, ex. 31a, their judgments; in this example and subsequent ones, complement clauses and adverbial phrases have been bracketed for clarity)

(4) Wo zhunbei [[mingtian xiawu tian hei yihou] wo yi ge ren lai].
I prepare tomorrow afternoon sky dark after I one CLF person come
"I plan to come alone after it gets dark tomorrow afternoon." (ibid., ex. 30a)

To explain unacceptable examples like (1), Hu et al. argue that Mandarin has an obviation principle where overt pronouns "[tend] to be obviative with the closest prominent NP" (p. 1134). In (1), the main clause subject *Lisi* is the closest prominent NP to the embedded overt pronoun subject *ta* "(s)he"; coindexing both subjects violates the obviation principle. (3), on the other hand, contains the adverbial phrase *jintian xiawu san-le hui yihou* "after the meeting has ended this afternoon", which not only contains NPs linearly closer to the pronoun, but more importantly, also makes the main clause subject farther away and less prominent. The obviation principle being satisfied, both subjects can be coindexed.

To be sure, there are some open questions in this proposal. Although the principle bears a resemblance to constraints on binding overt pronouns in Romance, Japanese, and other languages (e.g. Montalbetti 1984; Noguchi 1997; Cardinaletti & Starke 1999, and references therein), Hu et al. do not discuss exactly whether or how these are connected. Also unclear is the cause of the obviation effect: whether it reflects discourse or pragmatic factors or, as an anonymous reviewer suggests, interference and decay in sentence processing. There are also empirical problems. As formulated, obviation seems to require clause-like adverbial phrases containing overt NPs. However, as Hu et al. acknowledged (p. 1134), structurally simple adverbials like *jintian xiawu* "today afternoon" (i.e. "this afternoon") can also produce an obviation effect. The principle further incorrectly predicts (5) to be unacceptable, since there is no adverbial phrase at all (see also C.-T. J. Huang 2022). For scope reasons, however, this paper will be concerned with only Hu et al.'s claim regarding the obviative principle in control constructions.

(5) Lisi_1 zhidao [(ta_1) bu neng lai].
Lisi know 3SG not can come
"Lisi_1 knows s/he_1 cannot come."

2.3 The "dependent clause" account

Zhang (2016) presents a different view of counterexamples like (3) and (4). Following Grano 2015, Zhang notes that the overt subject must be controlled by the control verb's subject; supporting this point further, Zhang observes that in (3) and (4), the controlee is a bound "complemented pronoun" (after Szabolcsi 2009; I will refer to this as "cpro," following Zhang) – a complex consisting of a bound pronoun and a NP like *yi ge ren* "one CLF person." In contrast, no such binding requirement exists for the complements of belief clause-embedding verbs like *renwei* "think." Zhang interprets this difference as evidence for two types of complement clauses: control complements are "dependent" or nonfinite, while belief complements are not. For ease of reference, I will call this the "dependent clause" account.

As Zhang points out (p. 306ff.), this analysis entails that languages have some flexibility in encoding finiteness, so nonfiniteness does not always entail null embedded subjects, contrary to classical accounts (although Zhang does not address why sentences like (1) are unacceptable). Under the dependent clause view, Mandarin patterns with languages like Korean, Hungarian, etc., which allow bound overt subjects in (nonfinite) control complements (see Zhang 2016 for references). Citing Landau 2015, Zhang

suggests that what characterizes nonfinite clauses is not so much an inability to license overt NPs, but rather their licensing minimal pronoun subjects (in the sense of Kratzer 2009). Minimal pronouns bear unvalued phi-features that get valued by their binders, but are variously realized as PRO or as overt elements, depending on the language.[2]

One caveat is that this analysis assumes that the minimal pronoun facts are syntactic in nature, an assumption that one might question. It might be possible to give an alternative analysis of these generalizations that is consistent with Hu et al.'s claim that Mandarin lacks a finiteness distinction. Suppose that syntactically speaking, Mandarin control complements could host a wide range of overt subjects, as posited by the uniform complementation theory. However, control verbs impose additional semantic requirements on their complement clauses, and of all overt subjects, minimal pronouns (including cpros) happen to have properties that let complement clauses meet these requirements.[3] For instance, perhaps control complements have to denote predicates, and these pronouns are distinguished in that they can undergo covert movement, allowing the complement clause to be interpreted as a predicate via λ-abstraction (Zhang 2016:284-285).

2.4 Interim summary

To sum up, examples like (3) and (4) are theoretically interesting. They pose a challenge for "classical" accounts of finiteness in Mandarin, and instead suggest that either Mandarin does not make a finiteness distinction, with consequences for subcategorization (the "uniform complementation" account), or nonfinite clauses can license overt NP subjects, which are perhaps typologically less common and unexpected under conventional analyses of finiteness and case (the "dependent clause" account). This article takes a closer look at these examples, partly because of their theoretical value, but also for empirical reasons: there have been doubts about their acceptability. For instance, in footnotes, Ussery et al. (2016:5) and C.-T. J. Huang (2022:29) describe these examples as "marginal," "marked," or "awkward"; Paul (2018:9) states that these examples are "rejected as unacceptable by other native speakers or at best marginally accepted with a <u>different</u> parsing, where the alleged subject NP… is in fact an adjunct NP" (emphasis in the original). He (2020:367) reports that "many" native speakers consulted find these examples "unnatural." Assuming that these sentences are indeed ungrammatical, He further suggests some speakers might judge these sentences as acceptable because they are able to repair the representation so that the verb can "accommodate" the complement clause (ibid.).[4]

While important, these counterclaims do not come with more details beyond these observations. For that reason, they are difficult to evaluate, especially for researchers who do not have ready access to native speaker intuitions. In addition, because of their brevity, these counterclaims leave open the possibility that the examples might be marginally acceptable for non-grammatical reasons. For the sake of argument, suppose that overt controlees are harder to process than other types of subjects. For instance, perhaps the cpro subject in (3) and (4) is interpreted with some kind of focus (cf. remarks in Szabolcsi 2009 on Hungarian overt controlees). Suppose further that this processing difficulty is large enough to affect the acceptability of sentences containing cpros, regardless of whether control verbs are present. If so, marginal acceptability might have little or no bearing on the question of grammaticality. (That said, as far as I know, there is no independent evidence that overt controlees/cpros are that much harder to process.)

[2] Zhang's proposal for Mandarin departs from Szabolcsi's (2009) analysis of Hungarian. Szabolcsi argues that the overt subject in a nonfinite complement clause in Hungarian is licensed by the main clause's verb via long-distance agreement across the clause boundary.

[3] Note that this discussion of Zhang's cpro examples does not bear on her analysis of dependent/nonfinite subject clauses, which are a different construction.

[4] For thoroughness, I note that these remarks also pose problems for D. Li 2021. Although this proposal accepts that Mandarin has a finiteness distinction, it also argues that Mandarin partial control verbs, like *dasuan* "plan," allow finite complements with overt controlees, citing as acceptable examples with and without intervening adverbials (*contra* the three accounts discussed above).

To address these issues, I turn to formal acceptability judgment experiments, which provide finer-grained measures of acceptability. A growing body of research, especially on locality, has demonstrated how these experiments can help with evaluating competing claims and enriching our knowledge of variation within and across languages (Sprouse et al. 2012; Sprouse et al. 2016; Grano and Lasnik 2018; Keshev and Meltzer-Asscher 2019; Kush et al. 2019; Lu et al. 2020; N. Huang 2022). The present study applies this approach to a different domain – finiteness and control – while adding to experimental research concerned with data reliability in Chinese syntax (e.g. Lu et al. 2020, Chen, Xu, and Xie 2020 for recent work).

3 Experiments

3.1 Logic of study

This section presents acceptability judgment experiments aimed at addressing questions about the grammaticality of control verb constructions with overt controlee subjects, like (3) and (4). However, before discussing the experiments in detail, I will first review the general logic behind both experiments. Briefly, the idea is to compare these control verb constructions with structurally-similar baseline sentences whose grammaticality and acceptability are not in doubt. If these control verb constructions of interest are indeed as grammatical and as acceptable as they are sometimes portrayed to be, a natural expectation is that they should be comparable in acceptability with the grammatical baselines, while being distinctly more acceptable than the ungrammatical baselines.

Although the prior literature does not always spell out what baselines to use, there are two clear options, implemented here as two separate experiments. The first option (Experiment 1) uses control verb constructions that are identical in all respects except in the presence/absence of overt controlees and adverbs, as illustrated above in (1). I exploit the fact that there is a consensus that Mandarin control verb constructions allow null controlees. In the second option (Experiment 2), the critical baseline sentences are biclausal constructions with what I will call "belief verbs" ("think," "say", etc.) (6). Here, I exploit the fact that, unlike the case of control verbs, it is uncontroversial that belief verbs allow null and overt subjects in their complement clauses.

(6) Lisi renwei [(ta) hui lai].
Lisi think 3SG will come
"Lisi thinks that s/he will come."

The two experiments represent two different ways of evaluating the above claims about control verb constructions with overt controlees and adverbs. In addition, Experiment 2, involving belief verbs, addresses a limitation of Experiment 1. Suppose in Experiment 1, overt controlees are found to be less acceptable than null subjects in control verb constructions. While this outcome could be seen as validating classical accounts, recall that it would also be consistent with an alternative scenario where overt controlees (or cpros) simply have a general tendency to reduce a sentence's acceptability, even if the sentence is grammatical. Belief verbs provide a test of this alternative scenario: these subjects should also reduce the acceptability of belief verb constructions, relative to their null subject counterparts.

3.2 Experiment 1

As discussed above, this experiment uses control verb constructions as baseline sentences. In order to control for potential confounds, this experiment features a factorial design that crosses two factors: whether the complement clause contains an adverbial phrase and an overt embedded subject. Here, the overt subjects are all cpros, which have been explicitly argued to be grammatical by Zhang (2016). This design produces four conditions that are minimally different in syntax and semantics (7)-(10). Note that there is a consensus that the two null subject conditions (7)-(8) are grammatical, while the "overt subject, no adverbial" condition (9) is ungrammatical. The condition of interest is the "overt subject, adverbial" condition (10), which is deliberately modeled after examples said to be acceptable and grammatical under the uniform complementation and dependent clause accounts.

(7) *"Null subject, no adverbial" condition* (grammatical)
Zhe ge qiezei shefa [taochu juliu-suo].
this CLF burglar try escape detention-center
"This burglar tried to escape from the detention center."

(8) *"Null subject, adverbial" condition* (adverbial bolded; grammatical)
Zhe ge qiezei shefa [[**wuye shifen**] taochu juliu-suo].
this CLF burglar try midnight time escape detention-center
"This burglar tried to escape from the detention center at midnight."

(9) *"Overt subject, no adverbial" condition* (cpro underlined; ungrammatical)
Zhe ge qiezei shefa [ta yi ge ren taochu juliu-suo].
this CLF burglar try 3SG one CLF person escape detention-center
"This burglar tried to escape from the detention center by himself."

(10) *"Overt subject, adverbial" condition*
Zhe ge qiezei shefa [[**wuye shifen**] ta yi ge ren taochu juliu-suo].
this CLF burglar try midnight time 3SG one CLF person escape detention-center
"This burglar tried to escape from the detention center by himself at midnight."

The four conditions can be used to evaluate the following predictions. First, if "overt subject, adverbial" sentences (10) are grammatical (i.e. there is an obviation effect), it would be reasonable to expect these sentences to have a mean acceptability comparable to the two null subject conditions (7)-(8), given their similarities in structure and meaning. "Overt subject, adverbial" sentences should also be distinctly more acceptable than their "no adverbial" counterparts (9).

Borrowing from research on island effects (Sprouse, Wagers, and Phillips 2012, among many others), we can further quantify the size of the obviation effect with a "differences-in-differences" (DD) score, defined here as ((10) – (9)) – ((8) – (7)). The intuition behind the score is as follows: of the two overt controlee conditions, (10) is supposed to be grammatical but (9) is not. The acceptability difference between (10) and (9) should therefore be much larger than that between the two grammatical null subject conditions ((8) – (7)), corresponding to a positive DD score.

The above analysis can be generalized to acceptability rating distributions: If "overt subject, adverbial" sentences (10) are grammatical, ratings for these sentences should cluster on the acceptable end of the scale, as should ratings for the two grammatical null subject conditions. On the other hand, if Paul's and He's reports of interspeaker variability for "overt subject, adverbial" sentences are broadly correct, ratings for this condition should instead have a larger variance – be distributed over a wider range – than ratings for the null subject conditions. In fact, if "overt subject, adverbial" sentences are as ungrammatical as predicted by classical theories, ratings for these sentences should have a similar distribution to those for "overt subject, no adverbial" sentences (9).

3.2.1 Materials

Sixteen frames consisting of distinct lexical items were created (see Appendix). Eight subject control verbs were selected: *dasuan* and *jihua*, both roughly meaning "plan", *zhunbei* "prepare", *changshi*, *qitu*, *shefa*, *shitu*, all with "try" semantics, and *youyi* "intend". Each verb was paired with four frames to produce 32 sentences. For each sentence, four versions were created, corresponding to the four conditions in (7)-(10). The resulting 128 sentences were then sorted into 16 lists using a Latin Square design. In each list, each of the sixteen frames appeared only one time, and each verb appeared two times, once with a cpro subject in the complement and the other time without. There were four sentences per condition in each list.

The adverbial phrases were a mix of complex clause-like adverbials, as in (3), and structurally simple ones, as in (8). All had temporal semantics, following published examples, and were constructed to be plausible with the frames, so that (im)plausibility would not affect acceptability. An anonymous reviewer notes that structural variation in the adverbials might introduce a confound. However, post-hoc analyses, summarized in the discussion (Section 3.2.5), indicate that this is not an issue.

The target sentences only contained subject control verbs, and not object control verbs, because there is a general consensus in accounts arguing for a finiteness distinction in Mandarin (including Zhang 2016) that subject control verbs only take nonfinite clausal complements (but see Grano 2015; N. Huang 2018 for more nuanced analyses of (subject) control verbs and subcategorization, and D. Li 2021 for the claim that partial control verbs allow finite complements). Object control verbs like *quan* "advise, urge," on the other hand, might have more flexibility in subcategorization. As pointed out by Zhang (2016), Sybesma (2017), and C.-T. J. Huang (2022), English object control verbs (e.g. *advise*) often can take either finite or nonfinite complements, and it is not implausible that their Mandarin counterparts have a similar property. Put more simply, we are more likely to observe clearer acceptability effects with subject control verbs than with object control verbs.

A set of 32 filler sentences were created. 20 fillers were unacceptable and the remaining twelve acceptable. This distribution of fillers ensures that each participant would see two filler sentences for every one target sentence. Assuming that four out of the sixteen target sentences are unacceptable (namely, the "overt subject, adverbial" sentences), it also ensures that each participant would rate an equal number of acceptable and unacceptable sentences. Participants who are inclined to distribute their responses equally across the rating scale would then be less likely to artificially adjust their responses.

The filler sentences were added to each list of target sentences. Six filler sentences, intended to span a full range of ratings on an acceptability scale, appeared in a fixed order at the start of each list. The remaining 26 filler and 16 target sentences appeared in a pseudo-random order, so that no two target sentences appeared consecutively. Altogether, 48 pseudo-randomized lists (surveys) were created.

3.2.2 Participants

48 adult participants were recruited from the crowdsourcing website Prolific. All participants were self-identified Mandarin Chinese native speakers born in mainland China. Participants received US$1.60 upon completing the experiment, based on my estimate that it might take up to 8-9 minutes to complete the experiment and a US$12/hour rate. The Prolific recruitment process was set up so that a participant took part in either Experiment 1 or 2, but not both.

3.2.3 Procedure

This experiment was conducted over the Internet, using Qualtrics for data collection. Each participant was directed by the Prolific website to the Qualtrics website and randomly assigned to a pseudo-randomized list. Participants were instructed to use a seven-point scale to indicate how natural (*tongshun*) the sentences were. Participants were advised to use their own intuitions to rate sentences, and were told that there are no correct or wrong answers. They then saw three example sentences – one grammatical and acceptable, one ungrammatical and unacceptable, and one of marginal acceptability – with suggested acceptability ratings: 7, 1, and 4 respectively. Participants then proceeded with the experiment proper.

3.2.4 Data analysis

The z-score transformation was applied to each participant's ratings to correct for individual differences in the use of the rating scale. To ensure data quality, I extracted the 26 filler sentences that were interspersed with the target sentences, and calculated a mean z-scored acceptability rating and standard deviation for each filler sentence. For each participant, I counted how many filler items received ratings that were two standard deviations above or below the group mean. Out of an abundance of caution, I only analyzed responses by the 43 participants who had at most three "extreme" responses.

For the target items, a linear mixed effects model was constructed, using the R packages `lme4` and `lmerTest` (Bates et al. 2015; Kuznetsova et al. 2017). This analysis featured z-scored ratings of the target items as the dependent variable, the presence/absence of an adverbial phrase and overt subject as fixed factors, as well as participants, frames, and verbs as random factors, to control for idiosyncratic effects they

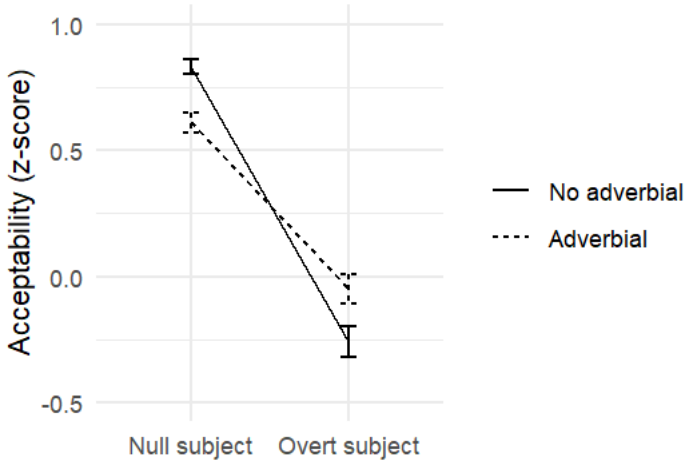
have on acceptability.[5] If sentences containing an overt controlee subject do become grammatical and much more acceptable when an adverbial phrase is added, there should be a statistically significant interaction effect between the two fixed factors, such that the effect size corresponds to the DD score.

To evaluate predictions about the distribution of acceptability ratings, I plot histograms of ratings for each condition and test for differences in distribution using the Brown-Forsythe test, which checks whether two non-normal datasets have equal variances.

3.2.5 Results and discussion

Figure 1 presents mean acceptability ratings of the four conditions. As expected, both null subject conditions have high mean z-scored ratings ("no adverbial": 0.83; "adverbial": 0.61). The "overt subject, no adverbial" condition has a much lower mean rating, at -0.26. The "overt subject, adverbial" condition, whose status is of interest here, has a mean rating of -0.05: slightly higher than the "overt subject, no adverbial" condition, but clearly lower than the two null subject conditions, especially the minimally-different "null subject, adverbial" condition. The DD score, an estimate of the size of the obviation effect, was 0.42, and corresponded to a significant interaction between the presence of an overt controlee and an adverbial phrase (b=0.42, $s.e.$=0.09, t=4.41, p<.01). Despite being positive and statistically significant, the obviation effect is weaker than what one might expect from Hu et al.'s proposal: "overt subject, adverbial" sentences are still on average much less acceptable than the "null subject" sentences.

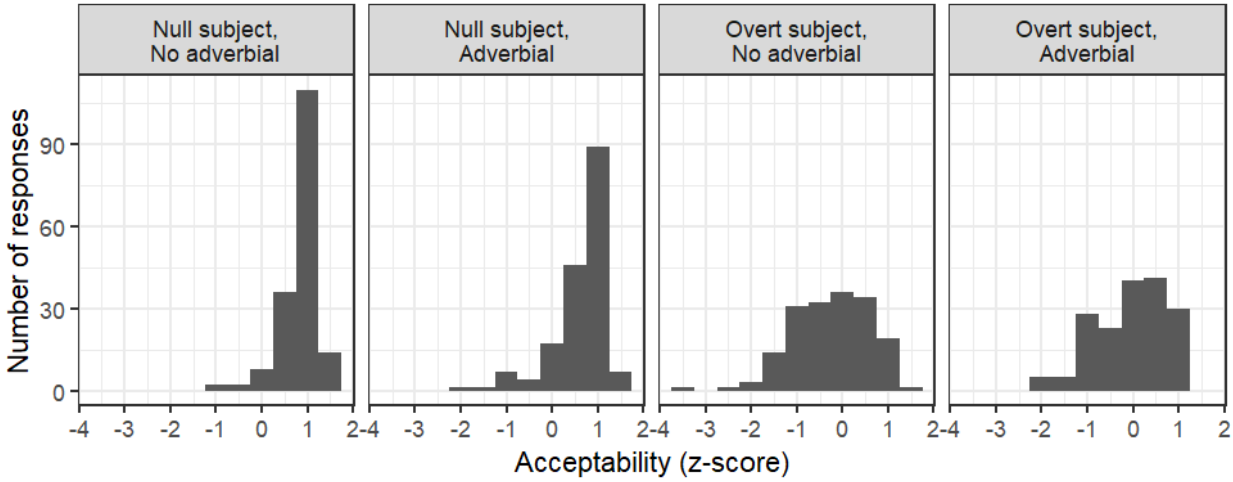
Fig. 1 Acceptability, by condition, for Experiment 1



Second, a closer inspection shows that the lower mean acceptability of "overt subject, adverbial" sentences reflects greater variability in acceptability ratings, consistent with He's and Paul's previous observations. For instance, the majority of ratings for "null subject, adverbial" sentences fall clearly in a 0.5-1.0 z-score range (Figure 2): participants reliably found them to be highly acceptable. In contrast, ratings for "overt subject, adverbial" sentences (differing only in having overt subjects) are distributed over a much wider range (Brown-Forsythe test F=24.5; p<.01). In fact, the ratings distribution for "overt subject, adverbial" sentences bears a striking resemblance to that for "overt subject, no adverbial" sentences, which are held to be unacceptable and ungrammatical. Here, the Brown-Forsythe test failed to find a difference in variances (F=0.2; p=.68).

[5] The formula used was: rating ~ adverbial*subject.type+ (1|participant) + (1|frame) + (1|verb). This was the model with the most complex random effects structure that converged and did not produce warnings suggesting overparametrization. A similar ordinal mixed effects model, fitted with the R package `ordinal` (Christensen 2019), produced very similar results. In particular, this ordinal model found a significant interaction effect in the same direction (b=1.62, $s.e.$=0.33, t=4.85, p<.01).

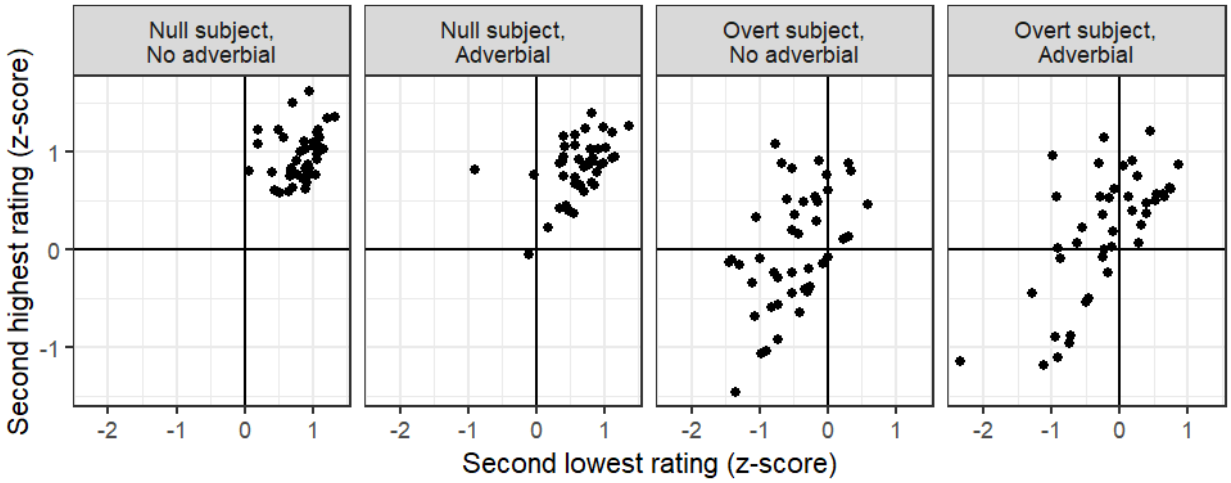
Fig. 2 Distribution of acceptability ratings by condition, Experiment 1



A by-participant analysis was done to understand to what extent this variability reflects variability between participants and within a single participant, adapting similar analyses by Kush, Lohndal, and Sprouse 2018; 2019. First, each participant's highest and lowest ratings for each condition were excluded, on the assumption that these might be outliers. The remaining second-lowest and second-highest ratings were then plotted, with each dot representing one participant (Figure 3). Each plot can be further divided into four quadrants, using a z-score of 0 as a convenient threshold. Participants who appear around the top right quadrant can be seen as reliably giving above-average ratings for that condition; those in the bottom left quadrant as reliably giving below-average ratings; and those in the top left quadrant are inconsistent.

Figure 3 shows that the vast majority of participants consistently gave above-average ratings for the two grammatical null subject conditions, but not for the "overt subject, adverbial" condition. Although there were participants who gave above-average ratings (top right quadrant), on the whole, there were also many who gave below-average ratings (bottom left quadrant) or inconsistent judgments (top left quadrant).

Fig. 3 Ratings by participant for Experiment 1 (each dot = one participant)

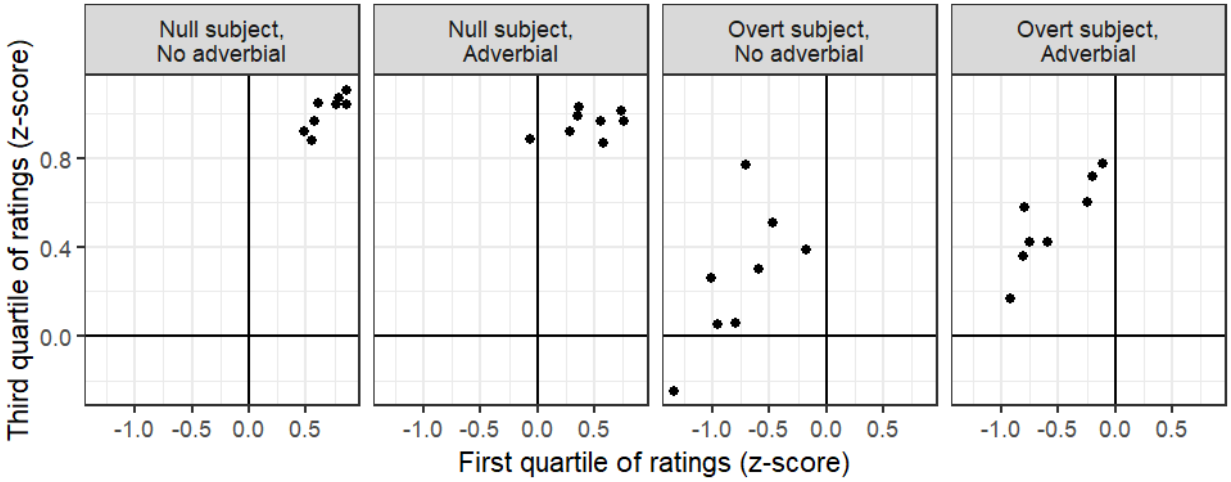


One possible explanation for this between-participant variability is that "overt subject, adverbial" sentences are grammatical for some, but not all, participants. While not impossible, this is not the only explanation available. As He and Paul suggest, it is also possible that these sentences are ungrammatical, but participants, while judging them for acceptability, tried to repair the representations of these sentences.

If successful, repair could produce a perception of acceptability, which could also explain the variability observed. A further advantage of this "ungrammatical-but-repaired" hypothesis is that it would also explain why a very similar variability was also seen for the ungrammatical "overt subject, no adverbial" condition (Figure 3). (I return to the issue of repair in the General Discussion.)

For thoroughness, a similar variability analysis was run for the control verbs. As an indicator of the consistency of ratings, the first and third quartile of ratings by verb and condition were plotted against each other. At the verb level, the "overt subject, adverbial" condition tended to receive lower ratings than the two null subject conditions; visually, the distribution for this condition also resembles that of the "overt subject, no adverbial" condition (Figure 4). More importantly, it suggests that the variability is not the result of the "overt subject, adverbial" condition producing consistently high ratings for one subset of control verbs, comparable with ratings for the null subject conditions, and consistently low ratings for another subset.

Fig. 4 Ratings by verb for Experiment 1 (each dot = one verb)



As mentioned in Section 3.2.1, an anonymous reviewer asked if the variation in adverbials could have introduced confounds. For instance, perhaps with clause-like or longer adverbials, the critical "overt subject, adverbial" sentences were rated as highly acceptable, comparable with the grammatical baselines. Post-hoc analyses suggest that this is not the case. Z-scored ratings for this condition were sorted into two categories, depending on whether the target sentence contained clause-like adverbials (9 frames, 96 responses) or simple ones (7 frames, 76 responses). Mean ratings were distinctly lower for both categories (clause-like: -0.01; simple: -0.10) than for "null subject, adverbial" baselines (clause-like: 0.56; simple: 0.68). A linear mixed effects model of "overt subject, adverbial" z-scores, with adverbial type as the predictor and random intercepts for participant, frame, and verb, did not find an acceptability difference between the two adverbial types (b=-0.07, $s.e.$=0.12, t=-0.56, p=.59). A second linear mixed effects model of acceptability for this condition was fitted, with adverbial length (in Chinese characters) as the predictor, but this model did not find evidence for a length effect (b=-0.03, $s.e.$=0.03, t=-0.80, p=.44).

In summary, Experiment 1 provided limited evidence for the claim that Mandarin control verbs allow overt subjects in their complement clauses when an adverbial phrase is present in the clause. Although adding an adverbial phrase did increase average acceptability, the effect is small: the resulting "overt subject, adverbial" sentences were still clearly worse than their counterparts with null subjects. Furthermore, ratings for "overt subject, adverbial" sentences had a much greater variance, echoing informal reports of interspeaker variability. In fact, the distribution of ratings for these sentences turned out to pattern with "overt subject, no adverbial" sentences, conventionally thought to be unacceptable and ungrammatical. This resemblance invites the inference that "overt subject, adverbial" sentences are similarly ungrammatical.

These results are problematic for the uniform complementation and dependent clause accounts. However, as mentioned in Section 3.1, one could try to defuse the problem with the additional hypothesis that bound overt subjects (or cpros, more specifically) are generally harder to process. This hypothesis would explain the lower average acceptability and variability in acceptability for the "overt subject, adverbial" sentences, while maintaining the claim that these sentences are grammatical. This hypothesis makes a further prediction: these subjects should have a similar effect on acceptability ratings for other constructions. Experiment 2, which seeks to compare control verb and belief verb constructions, provides a way to evaluate this prediction.

3.3 Experiment 2

Like Experiment 1, this experiment features a 2x2 design, crossing main verbs (subject control vs. belief verbs) and the absence/presence of an overt embedded subject (a cpro, specifically); note that all four conditions feature an adverbial phrase preceding the embedded subject, so all conditions should satisfy the obviation principle. The main goal here is to compare control verb constructions with overt embedded controlee subjects (12) with control verb constructions without such subjects (11), as well as with equivalent belief verb constructions (13)-(14). Note that all three baseline conditions are biclausal, and there is agreement in the Mandarin literature that they are all grammatical.

(11) *"Control, null subject" condition* (main verb bolded) (=(8))
Zhe ge qiezei **shefa** [[wuye shifen] taochu juliu-suo].
this CLF burglar try midnight time escape detention-center
"This burglar tried to escape from the detention center at midnight."

(12) *"Control, overt subject" condition* (subject underlined) (=(10))
Zhe ge qiezei **shefa** [[wuye shifen] <u>ta yi ge ren</u> taochu juliu-suo].
this CLF burglar try midnight time 3SG one CLF person escape detention-center
"This burglar tried to escape from the detention center by himself at midnight."

(13) *"Belief, null subject" condition*
Zhe ge qiezei **renwei** [[wuye shifen] keyi taochu juliu-suo].
this CLF burglar think midnight time can escape detention-center
"This burglar thinks that [he] can escape from the detention center at midnight."

(14) *"Belief, overt subject" condition*
Zhe ge qiezei **renwei** [[wuye shifen] <u>ta yi ge ren</u> keyi taochu juliu-suo].
this CLF burglar think midnight time 3SG one CLF person can escape detention-center
"This burglar thinks that he can escape from the detention center by himself at midnight."

As before, we can reduce the comparisons to a DD score, defined here as ((11) – (12)) – ((13) – (14)), which measures how a bound overt (cpro) subject (in the presence of an adverb) affects the average acceptability of control verb constructions vis-à-vis belief verb constructions. Under the uniform complementation and dependent clause accounts, sentences (11)-(14) are all grammatical. In terms of acceptability, such a subject should have the same effect on control verb sentences as on belief verb sentences, so the DD score should be close to 0.

In contrast, under the classical account, "control, overt subject" sentences (12) are ungrammatical: subject control verbs take nonfinite complement clauses, which cannot host overt subjects, cpro or otherwise. If so, the acceptability difference between the two control verb conditions should be positive. The two belief verb conditions, on the other hand, are both grammatical, and so the acceptability difference between these two conditions should be much smaller. The DD score, then, should be positive.

As mentioned above, these conditions also let us test the hypothesis about bound overt subjects like cpro being difficult to process and being associated with greater variability in acceptability ratings. Recall that this hypothesis, if correct, would strengthen the case for both the uniform complementation and dependent clause accounts. In this context, this hypothesis predicts that the two overt subject conditions (12) and (14) should have a wider range of ratings than the null subject conditions (11) and (13).

Finally, I note that the belief verb conditions differ from the control verb conditions in two subtle ways. First, the complement clauses of belief verbs contain the modal auxiliary *keyi* "can," which in my judgment was necessary for the acceptability of these sentences. Second, the null and overt subjects in these complement clauses are not necessarily interpreted as bound by the main clause subject: in principle, these subjects could also refer to some other contextually-salient individual. However, these two differences are unlikely to affect our results substantially. The DD analysis proposed here involves first comparing ratings within the two belief verb (and control verb) conditions, which neutralizes confounds due to *keyi*. As for the interpretation of the embedded subjects, since the sentences were presented without any context, the bound reading is most likely to be the one considered and judged by participants (see Grano and Lasnik 2018; N. Huang 2022 for a similar point in experiments involving bound pronouns in English).

3.3.1 Materials

The same sixteen frames and eight control verbs from Experiment 1 were used (see Appendix). Also selected were eight clause-embedding belief verbs: *renwei* "think," *juede* "feel," *yiwei* "mistakenly believe," *biaoming* "make clear," *shengcheng* "claim," *shuo* and *biaoshi*, both with "say" semantics, and *zhidao* "know."

Each verb was paired with four frames to produce a total of 64 sentences. For each sentence, four versions were created by systematically manipulating the presence of an overt pronoun subject and the choice of main verb, corresponding to the four conditions in (11)-(14). The resulting 256 target sentences were then sorted into 16 lists using a Latin Square design. In each list, no frame or verb appeared more than one time. There were four sentences per condition per list.

The resulting sentences were combined with the same filler items in Experiment 1 and sorted into pseudo-randomized lists in the same way as that experiment.

3.3.2 Participants and procedure

The recruitment of participants on Prolific and experiment procedure were the same as those of Experiment 1. Participants received US$1.50 upon completing the experiment, based on my estimate that it might take up to 8-9 minutes to complete the experiment and a US$10/hour rate. (Payments for Experiment 2 were marginally lower than for Experiment 1. This was because Experiment 2 was launched first; between that and launching Experiment 1, Prolific increased the minimum hourly rate for participants.)

3.3.3 Data analysis

The data analysis process was mostly the same as Experiment 1's. For each participant, the number of "extreme" responses to filler items were calculated; I only analyzed responses by the 44 participants who had three or fewer "extreme" responses. Target items were analyzed with a linear mixed effects model, with z-scored ratings as the dependent variable, the presence (absence) of an overt subject and the type of main verb (control vs. belief) as fixed factors, with random intercepts for frames and verbs, and random slopes for frames.[6] Variability analyses were also done, along the lines of Experiment 1.

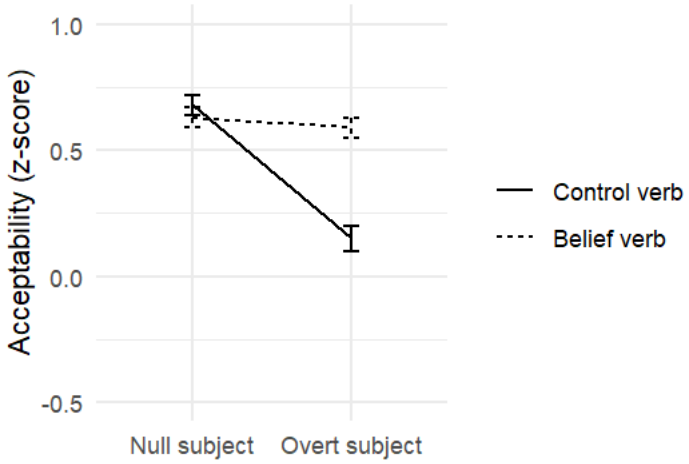
3.3.4 Results and discussion

Figure 5 displays the means and standard errors for acceptability ratings. "Control, overt subject" sentences were distinctly less acceptable than the other three conditions, which are all indisputably grammatical (in z-score terms, 0.15 vs. ~0.60). This contrast is also reflected in the positive DD score (0.48). Statistically, there was a significant interaction effect between subject type and verb class (b=0.48, s.e.=0.08, t=5.93, p<.01). This outcome is unexpected under the uniform complementation and dependent clause

[6] The formula used was: rating ~ verb.class*subject.type + (1+subject.type|frame) + (1|verb). Note that there was no by-verb random slope for verb class, since verbs are nested within verb classes. Models with more complex random effect structures were also tried but did not converge or produced warnings indicating overparametrization. A similar ordinal mixed effects model was also fitted. Like the linear mixed effects model, this model also found a statistically significant interaction effect between subject type and verb class (b=1.54, *s.e.*=0.30, z=5.11, p<.01).

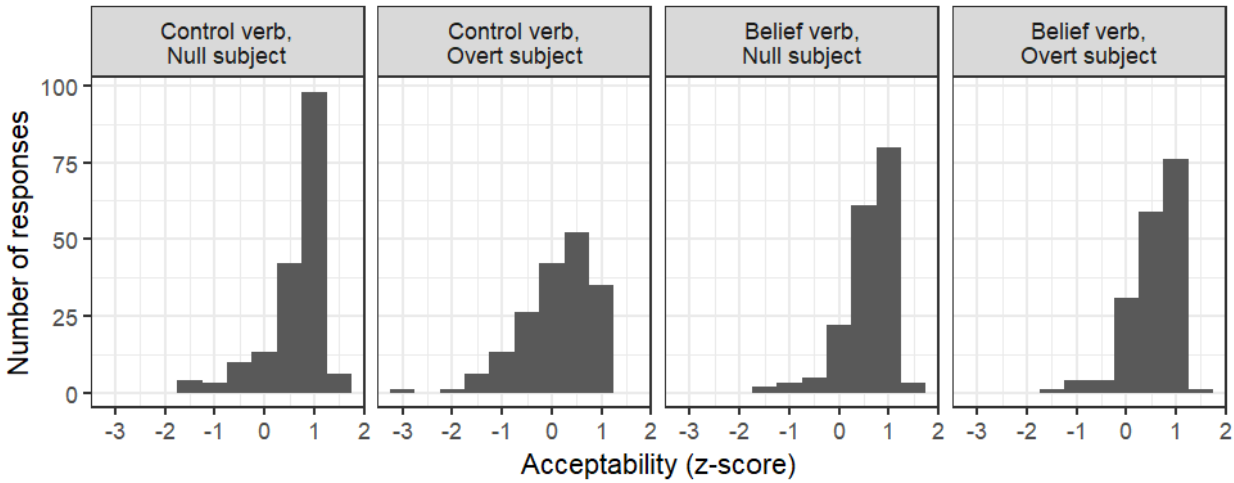
accounts, but predicted by the classical account. The high acceptability for the "belief, overt subject" condition (0.59) further shows that bound overt subjects/cpro do not always reduce the acceptability of sentences in which they appear, contrary to the processing difficulty hypothesis. Note that "control, overt subject" ratings are slightly higher here than in Experiment 1, where the mean rating is -0.05. This is probably because the experiments involved two different sets of participants judging a different mix of target sentences. It is unsurprising that participants would vary slightly in exactly how acceptable they find these sentences relative to the other target conditions.

Fig. 5 Mean acceptability, by condition, for Experiment 2



An inspection of rating distributions shows that the "control, overt subject" sentences were much more likely to have a wider spread of ratings than the other three conditions (Figure 6). Brown-Forsythe tests confirm that these sentences have a larger variance in ratings than "belief, overt subject" (F=31.1, p<.01) and "control, null subject" sentences (F=17.3, p<.01), which minimally differ in the type of main verb and subject. In other words, the variability in acceptability with embedded cpro subjects appears to be specific to control verb constructions.

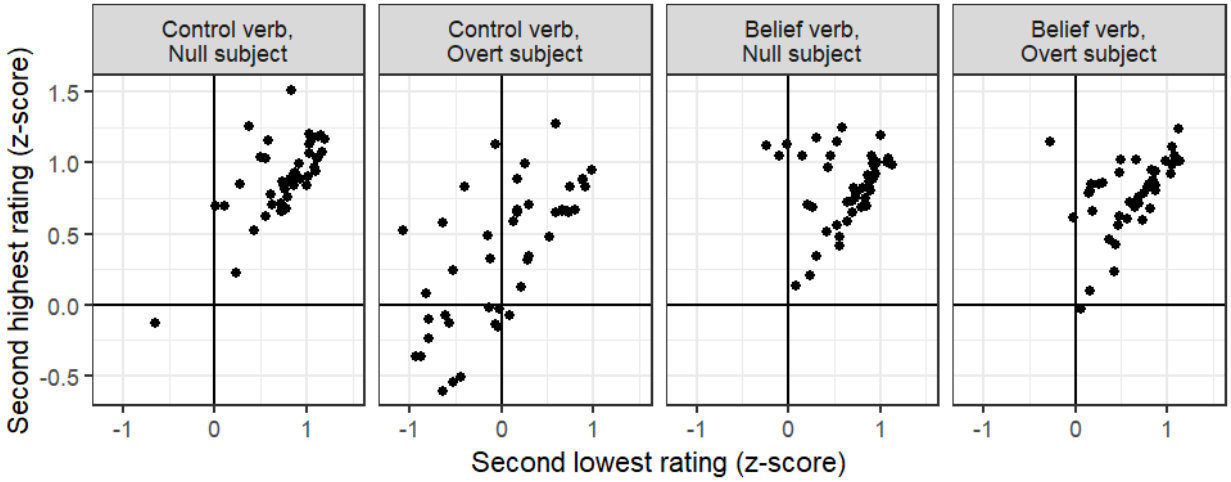
Fig. 6 Distribution of ratings by condition, Experiment 2



As was the case for Experiment 1, the variability associated with "control, overt subject" sentences is a composite of between-participant as well as within-participant variability. As Figure 7 shows, while there were participants who consistently gave these sentences above-average ratings (top right quadrant), many others either consistently gave below-average ratings (bottom left) or gave inconsistent ratings. Once

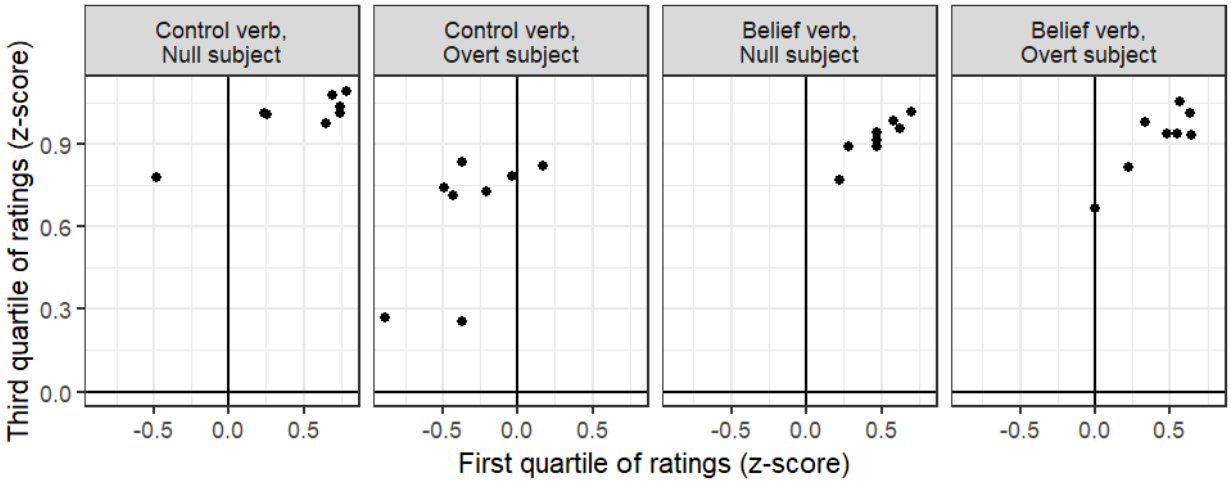
again, this condition contrasts rather starkly with the three baseline conditions, where participants were much likelier to give above-average ratings consistently.

Fig. 7 Ratings by participant for Experiment 2 (each dot = one participant)



At the verb level, "control, overt subject" sentences were much likelier to elicit lower and more inconsistent ratings compared with the other conditions (Figure 8). Similar to what was observed in Experiment 1, it was not the case that this condition elicited consistently high ratings (comparable with the baseline conditions) for a subset of verbs, and much lower ratings for another subset.

Fig. 8 Ratings by verb for Experiment 2 (each dot = one verb)



Finally, post-hoc analyses were run for the critical "control, overt subject" condition, to see if a subset of adverbials produced high acceptability ratings comparable to grammatical baselines. These analyses were identical to those described in Section 3.2.5 for Experiment 1. Sentences containing clause-like and simple adverbials both had mean ratings that were clearly lower (clause-like: 0.25; simple: 0.02) than their "control verb, null subject" counterparts (clause-like: 0.63; simple: 0.74). A linear mixed effects model did not find a significant acceptability difference between clause-like and simple adverbials for the "control, overt subject" sentences (b=-0.18, $s.e.$=0.12, t=-1.53, p=.21). Nor was there a significant effect of adverbial length on acceptability for these sentences (b=-0.07, $s.e.$=0.04, t=-1.72, p=.11).

4 General discussion

To recap, the two experiments were designed to evaluate prior claims that control constructions whose complement clauses contain adverbial phrases and an overt subject, like (3) (repeated below as (15)), are acceptable. Their acceptability has been cited by Hu et al. (2001) as evidence that Mandarin makes no finiteness distinction ("uniform complementation" account), and by Zhang (2016) as evidence that Mandarin encodes a finiteness distinction in which nonfinite clauses exceptionally allow overt controlee subjects ("dependent clause" account). Either claim is of theoretical interest: Hu et al.'s proposal has consequences for theories of subcategorization and selection, while Zhang's proposal bears on how finiteness is realized cross-linguistically, specifically, whether nonfinite clauses can license overt subjects.

(15) Ni zuihao shefa [[jintian xiawu san-le hui yihou] ni yi ge ren lai].
you had.better try today afternoon end-PFV meeting after you one CLF person come
"You had better try to come by yourself after the meeting ends this afternoon." (Hu et al. 2001:1131, ex. 31a, their judgments)

Results of the two experiments present problems for both accounts. Sentences like (15) turn out to have an acceptability profile that is distinct from minimally-different baseline constructions whose grammaticality is not in doubt. Although Experiment 1 at first glance provided some support for Hu et al.'s obviation principle, it also showed that ratings for these sentences are lower on average and more variable than grammatical control verb constructions with null subjects. In fact, the variability of ratings for these sentences strongly resembled that for control verb constructions with overt controlee subjects but without an intervening adverbial phrase, which are generally described as unacceptable and ungrammatical. Experiment 2 showed that ratings for sentences like (15) are lower and more variable than grammatical, syntactically-similar control verb and belief verb constructions. This outcome also shows that bound overt subjects/cpros are not generally associated with lower overall acceptability and greater variability in ratings, which would have let one maintain the uniform complementation and dependent clause accounts in a way consistent with the results of Experiment 1.

Collectively, these findings suggest that Mandarin imposes some restriction against overt controlees/cpro subjects inside (subject) control complements, even when adverbial phrases are also present. These results are not expected under the uniform complementation and dependent clause accounts, as currently formulated. Some additional hypothesis is therefore needed to explain this restriction, if one is to maintain the claim that overt subjects inside control complements are grammatical.

One option might be to posit dialectal variation: perhaps the accounts describe a variety of Mandarin different from the one(s) spoken by the participants. However, as formulated, these accounts are silent about the possibility of within-language variation. In fact, such a position would be inconsistent with the spirit of Hu et al.'s uniform complementation account, which seeks to make the stronger claim that a finiteness distinction does not exist in Mandarin in general. Another option is to develop an extra-grammatical account of this restriction between overt controlee subjects or cpro and control verbs, perhaps by appealing to factors like anaphoric processing or pragmatics. Although logically possible, it seems challenging to specify what exactly these factors might be and why such a restriction would exist. Given the absence of any other contextually salient referent, it should be easy and natural to interpret the overt controlee as being bound by the control verb's subject.

The experiment results follow more easily from what I call a classical account of finiteness (e.g. C.-T. J. Huang 1982; 1989; Y.-H. A. Li 1985; 1990), in which control verbs in Mandarin subcategorize for nonfinite clauses and nonfinite clauses cannot host overt subjects. This account straightforwardly explains why sentences like (15) are relatively unacceptable and have an acceptability profile that differs from grammatical control verb baselines with null subjects, while resembling ungrammatical control verb baselines (Experiment 1). This account also correctly predicts that overt embedded subjects reduce the acceptability of control verb sentences relative to belief verb baselines (Experiment 2).

To be sure, the results also present some challenges for the classical account. First, it does not automatically predict the weak obviation effect that arises when a control complement contains an adverbial phrase and an overt controlee subject (Experiment 1). Nor does it explain why speakers sometimes assigned high acceptability ratings to these sentences (Experiments 1 and 2). Here, I would like to offer some suggestions, building on recent comments in the literature supportive of the classical account.

Consider He's (2020) coercion proposal: when presented with control verb constructions with an overt controlee subject, speakers might try to repair the representation of these sentences by replacing the control verb with a semantically-related predicate that actually allows a complement clause with such a subject. In Experiments 1 and 2, perhaps the temporal semantics of the adverbial phrases made it easier to identify a suitable replacement predicate. Exactly how this process works will have to await future research, but one possible scenario might be the following: the adverbial phrases are vague as to whether they are in the future of the event denoted by the control verb. If participants assigned a future interpretation, they might find it easier to replace the control verb with a verb like *xiwang* "hope," *panwang* "look forward to," *yuliao* "predict," which allow overt subjects in the complement clause and are closely associated with hopes and expectations for the future. More generally, the intuition being pursued here is that greater ease of replacement improves the odds of successful repair, which makes it more likely that these sentences would be rated as more acceptable. This in turn would translate into a larger obviation effect.

Paul (2018) and He (2020) also suggest a second repair scenario: speakers might attempt to repair the complement clause by reanalyzing the cpro subject as an adverbial phrase, so that the complement clause has a null subject. While this scenario does not explain the obviation effect of adverbial phrases, it does provide a way to understand why speakers sometimes gave high ratings to control verb constructions containing overt subjects – even those without adverbial phrases, as in Experiment 1. Since adverbial phrases are typically preverbal in Mandarin, just like subjects, this repair operation would not involve substantial word order changes, and should be quite straightforward.

To sum up, the results of both experiments are broadly consistent with the claim that Mandarin makes a finiteness distinction along the lines proposed by the classical account, supplemented with reasonable assumptions about repair. From a typological perspective, such a conclusion suggests that, its lack of overt (non)finite verbal morphology notwithstanding, Mandarin encodes the finiteness distinction in a rather conventional manner with the presence (absence) of overt subjects. At the same time, it is worth emphasizing that such a conclusion is specific to Mandarin and perhaps other Chinese varieties. It does not neutralize the problem posed for classical theories of finiteness by overt controlee subjects in other languages, such as Hungarian or Korean. Nor does it invalidate proposals of finiteness or overt subject licensing capable of accommodating those languages, such as Szabolcsi 2009 or Landau 2015.

5 Conclusion

This article reported two acceptability judgment experiments aimed at evaluating prior claims that Mandarin control verbs allow complement clauses with overt subjects; these claims have been used to support proposals that Mandarin makes no finiteness distinction, or that Mandarin control verbs have nonfinite complement clauses that allow overt controlee subjects, in which case Mandarin might be seen as a typological outlier. Experiment results, however, show that sentences with such subjects are actually less acceptable than claimed in these proposals. The results instead validate concerns occasionally raised about the acceptability of these sentences, and point in favor of a scenario in which Mandarin control verbs take nonfinite complement clauses that disallow overt subjects, as is often the case for languages with richer verbal morphology.

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