Copy control and partial raising at syntax-semantics-discourse interfaces

Chit-Fung Lam

University of Manchester

Proceedings of the LFG'23 Conference

Miriam Butt, Jamie Y. Findlay and Ida Toivonen (Editors)

2023

PubliKon

lfg-proceedings.org

Abstract

This paper centres on two complement-control phenomena, namely copy control and partial raising using novel data from Mandarin Chinese. For copy control, conclusions are drawn regarding the overt controllee, including its licensing condition and how it differs from resumptive and intrusive pronouns in the cross-linguistic literature. Copy control helps draw the dividing line between functional-control vs anaphoric-control equi verbs in Mandarin Chinese. This highlights a key insight that formal control mechanisms need to be determined empirically on the basis of the grammatical properties of individual matrix verbs in individual languages. Regarding partial raising, the paper shows that Mandarin Chinese allows partial raising where the matrix verb subcategorises for an athematic OBJ. This challenges the existing view that partial raising is an impossible construct. Formal solutions are explored by integrating LFG with Glue Semantics and Partial Compositional Discourse Representation Theory to explicitly model the syntax-semantics-discourse interfaces.

1 Introduction[1]

Mandarin Chinese is a discourse pro-drop language with omissible subjects and objects (C.-T. James Huang, 1984, 1989; see also Roberts & Holmberg, 2010). In a complementation structure, the matrix verb plays a role in determining the referential properties of its embedded subject. While some matrix verbs (e.g., *shuo* 'say', *renwei* 'think') allow the unexpressed embedded subject to be any discourse-salient entity, others (e.g., *shefa* 'try', *jinli* 'endeavour') exert coreference restrictions on their unexpressed subject in the complement clause, as illustrated in (1). In this paper, I label the former as "non-control" (or "discourse pro-drop") verbs, and the latter "control" verbs, based on the referential properties of the embedded subject, given that Chinese has no overt markers for finiteness.[2]

[1] The paper discusses a few findings from my PhD dissertation (Lam 2023). I am deeply appreciative of the guidance provided by my supervisors, Kersti Börjars and Eva Schultze-Berndt, as well as the feedback from my examiners, John Lowe and Richard Zimmermann. I would also like to express my gratitude to Helge Lødrup and Ash Asudeh for their valuable feedback during the LFG23 conference, as well as the insightful discussions with Helge Lødrup via email. Also, I am grateful to Nigel Vincent for providing comments on my draft. Finally, many thanks to the anonymous reviewers and editors for their constructive feedback and handling of this paper. Any error in this paper is mine.

[2] Many Generative studies argue that Chinese displays finiteness distinction at an abstract level. For a recent discussion, see e.g., C-T. Huang (2022). I do not engage in the finiteness debate in this paper, but readers may refer to Chapter 3 of Lam (2023), where I re-visit two classical diagnostics which can shed light on the nature of Chinese finiteness.

(1) a. Non-control/discourse pro-drop
xiaoming$_i$ shuo Ø$_{i/j}$ qu-le lundun
Xiaoming say go-PFV London
'Xiaoming says (he/she/they) have been to London.'
b. Control
xiaoming$_i$ shefa Ø$_{i/*j}$ jiejue wenti
Xiaoming try resolve problem
'Xiaoming tries to resolve the problem.'

Since Bresnan (1982), LFG characterises two major model-theoretical control mechanisms, namely functional control and anaphoric control. Some studies, such as Dalrymple et al. (2019) and Haug (2013), further distinguish between three subtypes of anaphoric control, namely obligatory anaphoric control, arbitrary anaphoric control, and quasi-obligatory anaphoric control. This paper follows this categorisation of control mechanisms. Furthermore, following Dalrymple et al. (2019), I integrate LFG with Glue Semantics and Partial Compositional Discourse Representation Theory (PCDRT). An advantage of this integrated approach is its potential to formally model the interaction between syntax, semantics, and discourse in control relations.[3] For more details about PCDRT, readers may refer to Haug (2013; 2014), and Dalrymple et al. (2018).[4] In short, Discourse Representation Structures (DRSs) in PCDRT model the monotonic (semantic) content of the discourse, which cannot be denied in the subsequent discourse without causing inconsistency. Coreference resolution is dealt with post-semantically in the pragmatics via an anaphoric resolution function A, relating anaphoric discourse referents to antecedent discourse referents within a DRS. A arises from non-monotonic reasoning and can be updated in subsequent discourse. In this formal setting, A is a composite function that comprises, among others, the function R, which maps an anaphoric index to an antecedent index. As will be shown, R often plays an important role in the lexical entry of a control verb to license its control relation.

In the following sections, I focus on two empirical observations, providing formal analyses of new empirical data and discussing their implications. The observations are copy control and partial control with an athematic controller (i.e., partial raising). While there have been discussions on copy raising (Asudeh and Toivonen 2012), little attention has been paid to copy control in the LFG literature.

[3] Since the early days, it has been recognised that control theory involves complex interaction between syntactic, semantic, and pragmatic factors. E.g., In the Government and Binding era, Chomsky (1981: 79-79) pointed out that the theory "involves a number of different factors: structural configurations, intrinsic properties of verbs, other semantic and pragmatic considerations. Sorting these factors out and explaining the cross-linguistic differences and similarities remains an open problem."

[4] In recent studies, there is also a variant known as "Partial Plural Compositional DRT" (PPCDRT), which has been proposed to model reciprocal scope (see e.g., Dalrymple & Haug 2022; Haug & Dalrymple, 2020).

Furthermore, although partial raising has been considered impossible by a number of studies in the general literature on control theory (Landau 2000; Pearson 2016), I have observed data to support this phenomenon in Mandarin Chinese. Thus, this paper helps to fill critical gaps in the existing literature.

2 Copy control

In Chinese, a number of control verbs have been documented to license a phenomenon known as copy control. In copy control, the controllee (Ø) is replaced by an overt pronoun, which shares the same reference as the controller under the condition that there is an intervening adverbial between the predicate and the overt controllee (see e.g., Grano 2015; Hu et al., 2001; Zhang 2016).

2.1 Empirical data: overt controllee vs resumptive pronoun vs intrusive pronoun

(2) displays the data of *shefa* 'try' and *gongxi* 'congratulate', both of which permit copy control under the presence of an intervening adverbial. In the general literature, these verbs are known as "equi" verbs, exhibiting an exhaustive control relation between the controller and controllee.

(2) a. *shefa* 'try' without copy control
xiaoming **shefa** {Ø|*ta} wangcheng gongke
Xiaoming try 3SG complete homework
'Xiaoming tries to complete the homework.'

b. *shefa* 'try' with copy control
xiaoming zuihao **shefa** (jintian xiawu san-le hui
Xiaoming$_i$ best try today afternoon be.over-PFV meeting
yihou) {Ø$_{i/*j}$|ta$_{i/*j}$} yi-ge-ren lai
after 3SG one-CL-person come
'Xiaoming had better try to come by himself this afternoon after the meeting is over.' (adopted from Hu et al., 2001: 1130)

c. *gongxi* 'congratulate' without copy control
xiaoming$_i$ **gongxi** zhangsan$_j$ {Ø$_{*i/j}$|*ta} shengchu-le
Xiaoming congratulate Zhangsan 3SG win-PFV
'Xiaoming congratulates Zhangsan for winning.'

d. *gongxi* 'congratulate' with copy control
xiaoming$_i$ **gongxi** zhangsan$_j$ (zai zhe-chang bias
Xiaoming congratulate Zhangsan in this-CL competition
zhong) {Ø$_{*i/j}$|ta$_{*i/j}$} shengchu-le
within 3SG win-PFV
'Xiaoming congratulates Zhangsan for winning in this competition.'

However, not all equi verbs can license copy control. In Chinese, *daibiao* 'represent' and *xue* 'learn.from' behave as subject-control equi verbs, unlike their English counterparts. Evidence for their equi-verb status includes (i) the obligatory presence of the lower clause, as shown in (3), which indicates that the lower clause is one of the subcategorised arguments; (ii) the exhaustive reading of the unexpressed subject, which is lexically determined by *daibiao* 'represent' and *xue* 'learn.from', coupled with the unavailability of an overt pronoun before the embedded verb in (4). (4) displays that these verbs do not allow copy control despite the presence of an intervening adverbial.

(3) a. xiaoming **daibai** gongsi *(chuxi huiyi)
Xiaoming represent company attend conference
Lit.: 'Xiaoming represents the company to attend the conference.'
'Xiaoming represents the company at the conference.'
b. xiaoming **xue** zhangsan *(tiaowu)
Xiaoming learn.from Zhangsan dance
Lit.: 'Xiaoming learns from Zhangsan to dance'
'Xiaoming learns from Zhangsan how to dance.'

(4) a. xiaoming$_i$ **daibiao** xuexiao$_j$ (zai mingtian fangxuehuo
Xiaoming represent school at tomorrow after.school
yihou) {Ø$_{i/*j}$|*ta} canjia bisai
after 3SG participate competition
Lit.: 'Xiaoming represents the school to participate in the competition tomorrow after school.'
'Xiaoming represents the school, participating in the competition tomorrow after school.'
b. xiaoming$_i$ **xue** zhangsan (meifeng xingqisan fangxue
Xiaoming learn.from Zhangsan every Wednesday after.school
yihou) {Ø$_{i/*j}$|*ta} da lanqiu
after 3SG play basketball
Lit: 'Xiaoming learns from Zhangsan to play the basketball every Wednesday after school.'
'Xiaoming follows Zhangsan's example to play the basketball every Wednesday after school.'

Likewise, raising verbs reject copy control, as exemplified in (5).

(5) a. xiaoming$_i$ **sihu** [jintian xiawu] {Ø$_{i/*j}$|*ta} yao yi-ge-ren qu
Xiaoming seem today afternoon 3SG will one-CL-person go
'Xiaoming seems to go by himself this afternoon.'
b. xiaoming$_i$ **xiangyao** zhangsan$_j$ [jintian xiawu] {Ø$_{i/*j}$|*ta}
Xiaoming want Zhangsan today afternoon 3SG
yi-ge-ren qu
one-CL-person go
'Xiaoming wants Zhangsan to go by himself this afternoon.'

Sihu 'seem' selects for a raised subject *Xiaoming*, and *xiangyao* 'want' selects for a raised object *Zhangsan*.[5]

Thus, the data show that there are two classes of equi verbs divided based on their behaviour of copy control: while most equi verbs (e.g., *shefa* 'try') permit copy control, some equi verbs (e.g., *daibiao* 'represent') reject copy control and instead align themselves with raising verbs (e.g., *sihu* 'seem'). After sorting out the empirical data, the remaining challenge is how we may interpret the empirical division with reference to formal control mechanisms, a task that I will take on by referring to LFG control theory.

Before then, note that the overt controllee in Chinese copy control is a "genuine" pronoun on par with an ordinary pronoun in the sense that each takes up an independent grammatical function as the embedded SUBJ. Some studies (e.g., Grano, 2015) regard it as a type of "resumptive" strategy with the overt controllee being a resumptive pronoun. However, an "overt controllee" is different from the type of "resumptive pronoun" often found in the cross-linguistic literature which is related to long-distance dependency, with the displaced phrase being related to a resumptive pronoun instead of a gap. For example, the underlined resumptive pronoun in (6) is required in lieu of a gap:[6]

[5] To prove the raised object status of the *xiangyao* 'want' construction, one may conduct a semantic-entailment test as illustrated in (15). *Xiangyao* 'want' may also function as a subject-control verb, as in (i):
(i) zhangsan xiangyao qu yingguo
Zhangan want go UK
'Zhangsan wants to go to the UK.'
Note that the English verb *want* can also select for a raised subject in certain contexts.
(ii) Sally wants to work harder.
As discussed by Vincent (forthcoming), (ii) can also be used in a context that expresses the opinion of Sarah's teacher even if Sarah herself does not have such a wish. However, *xiangyao* 'want' cannot select for a raised subject, unlike its English counterpart.

[6] Asudeh (2012) further distinguishes between two types of resumptive pronouns, namely syntactically active resumptives (SARs), which are attested in e.g., Irish, and syntactically inactive resumptives (SIRs), which are attested in e.g., Swedish.

(6) an ghirseach ar ghoid na síogaí <u>í</u> (Irish)
the girl COMP.PAST stole the fairies her
'the girl that the fairies stole (her) away.' (McCloskey, 2002: 189)

Likewise, an overt controllee is distinct from an "intrusive" pronoun (also known as a "returning" or "processor" pronoun), which involves long-distance dependency but differs from a resumptive pronoun in the aspect that an intrusive pronoun cannot receive a bound interpretation but a resumptive can (see e.g., Asudeh, 2012; Sells, 1984). For example, the underlined English pronouns in (7) are deemed as intrusive pronouns (Asudeh 2012; Sells 1984).[7]

(7) a. This is the girl that Peter said that John thinks that yesterday his mother had given some cakes to <u>her</u>. (Erteschik-Shir, 1992: 89)
b. I'd like to meet with the linguist that Mary couldn't remember if she had seen <u>him</u> before. (Sells, 1984: 11)

Asudeh (2012: ch. 11) adopts a general processing model for intrusive pronouns, arguing that they are not licensed by grammar but arise from incremental processing. Nevertheless, for Chinese copy control, a processing-based account would not be sufficient to explain the contrast between the two classes of equi verbs as well as why raising verbs resist copy control. For instance, given an intervening adverbial of the same length, a processing-based account would easily give the wrong prediction that *daibiao* 'represent' and *xue* 'learn.from', which are subject-control equi verbs that select for an object, favour copy control more than *shefa* 'try' and *gongxi* 'congratulate' due to the longer linear distance between the controller and the controllee position. Instead, I argue that the licensing of copy control is pertinent to formal grammar.

2.2 Implications: two classes of equi verbs

As mentioned previously, LFG assumes two major control mechanisms, namely functional control and anaphoric control. Functional control involves structure sharing between the controller and controllee in the dependency structure (f-structure). A well-documented consequence of structure sharing is that the controllee cannot be replaced by an overt pronoun (see e.g., Bresnan 1982; Mohanan 1983).[8]

[7] Asudeh (2012: 41) points out that English intrusive pronouns are born out of a cross-linguistically available processing strategy where a gap could lead to processing difficulties (caused by sentence complexities) or ungrammaticality (e.g., island and COMP-trace effects).

[8] Otherwise, the overt pronoun would contribute a superfluous PRED value to the embedded subject (controllee), violating the Uniqueness condition, which governs the well-formedness of all f-structures (Kaplan & Bresnan, 1982).

LFG assimilates raising into its control theory. It is rather uncontroversial in LFG that raising verbs are functional-control verbs (Bresnan, 1982; Dalrymple et al., 2019: ch. 15) and anaphoric control is not a viable machinery to model raising. A theory-internal reason is derived from the Coherence condition, which governs the well-formedness of all f-structures:

(8) Coherence condition
All governable grammatical functions present in an f-structure must occur in the value of a local PRED feature. All grammatical functions that have a PRED value must have a theta role.
(Börjars et al., 2019: 22; see also Kaplan & Bresnan, 1982)

In raising constructions, the controller bears a PRED value but its local predicate does not assign a theta role to it. Modelling raising with functional control enables f-structure sharing such that the PRED-bearing controller takes on an argument function of the embedded predicate, thus preserving the Coherence condition. On the contrary, anaphoric control lacks such f-structure sharing machinery to allow the PRED-bearing controller to be an argument of the embedded predicate, thus violating the Coherence condition.

On the other hand, there has been a continuous debate about whether English equi verbs (e.g., *try*) should be modelled as functional control (Bresnan, 1982; Asudeh, 2005) or (obligatory) anaphoric control (Dalrymple et al., 2019: ch. 15).[9] For languages which have a richer case marking system (e.g., Tagalog, Icelandic), the determination of functional vs anaphoric control may be signalled by the case markers on the arguments. For example, Tagalog has been argued to have both functional and anaphoric-control equi verbs due to the differential case marking (Kroeger 1993). Another language-specific property which has been used to differentiate between functional and anaphoric-control equi verbs is the impersonal passive construction in Norwegian (Lødrup, 2004). The key point is that whether equi verbs adopt functional or anaphoric control needs to be determined empirically on the basis of the grammatical properties of individual matrix verbs in individual languages.

Chinese lacks case marking, nor does it have impersonal passive; however, we have seen that there are two classes of equi verbs which differ in their ability to license an overt controllee. This is an empirical distributional fact that needs to be

[9] Falk (2001: 137-138) uses the contrast between *try* and *agree* as empirical evidence that English has two equi classes. However, since Landau (2000: 53; 2013: 158), *agree* has been recognised as a partial-control verb rather than an equi verb. Therefore, evidence remains unclear whether English has two equi classes. Here, I assume that partial-control verbs are not equi verbs. This is because the term "equi" stems from "Equi NP Deletion" in early transformative grammar, implying that there are two underlying equal instances of controller and controllee NPs. However, in partial control, the controller denotes a subset of the controllee. In other words, the controller and controllee should by no means be represented by two underlying equal instances.

interpreted given any grammatical theory. Subscribing to the LFG framework, I interpret this property as signalling a split between functional- and anaphoric-control equi verbs in this language. For equi verbs that enable copy control (e.g., *shefa* 'try', *gongxi* 'congratulate'), I take this empirical fact as a signal that the formal control mechanism of these verbs is anaphoric rather than functional. My theoretical position is in line with the general assumption in the LFG literature that if a controllee can be replaced by an overt pronoun, this constitutes empirical evidence for anaphoric control (Bresnan, 1982; Mohanan, 1983; Dalrymple et al., 2019: ch. 15). On the other hand, for those equi verbs which resist copy control (e.g., *daibiao* 'represent'), I posit that they adopt functional control, whose f-structure sharing mechanism by default rules out the existence of an overt pronoun in the controllee position. This theoretical position is also supported by the distributional fact that these equi verbs cluster with raising verbs in terms of their resistance towards copy control, given that raising verbs are indisputably functional-control verbs.

2.3 Formal implementation for two equi classes: LFG + Glue + PCDRT

Given the above discussion, I now illustrate how to model *shefa* 'try' with obligatory anaphoric control as well as *daibiao* 'represent' with functional control. (9) displays the lexical entry of *shefa* 'try'.

(9) *shefa* 'try' V

1st line $(\uparrow \text{PRED}) = \text{'TRY}\langle\text{SUBJ, COMP}\rangle\text{'}$

2nd line $R\ ((\uparrow \text{COMP SUBJ})_\sigma \text{ INDEX}) = ((\uparrow \text{SUBJ})_\sigma \text{ INDEX})$

3rd line $\lambda x.\lambda P.[\ |\ try(x, P)]: (\uparrow \text{SUBJ})_\sigma \multimap [(\uparrow \text{COMP})_\sigma \multimap \uparrow_\sigma]$

4th line $\neg[(\uparrow(\text{COMP}) \text{ ADJ} \in) <_{\text{f.immediate}} (\uparrow \text{COMP SUBJ})]$

$\Rightarrow (\uparrow \text{COMP SUBJ PRED}) = \text{'PRO'} \wedge \lambda P.[\underline{x}_1 \mid\ ];\ P(\underline{x}_1): \forall H.[(\uparrow \text{COMP SUBJ})_\sigma \multimap H] \multimap H$

The R function for anaphoric resolution in the second line of the lexical entry of *shefa* 'try' holds no matter whether the controllee is overt or not. It results in the prediction that when the controllee is overt, it still has to be coreferential with the controller SUBJ, which is in line with the data in (2b). The third line is a PCDRT-based meaning constructor for *shefa* 'try'. This meaning constructor is an essential part of the semantic derivation. The fourth line is an implicational constraint with a negative condition used to constrain copy control. It involves an independently defined relation termed "immediate f-precedence":[10]

[10] The formal definition of "immediate f-precedence" is, to some extent, inspired by Asudeh's (2009) Complementizer Adjacent Extraction Constraint, although there are significant differences between the two.

(10) Immediate f-precedence:
The f-structure f immediately f-precedes the f-structure g ($f <_{\text{f.immediate}} g$) if and only if the rightmost node in $\phi^{-1}(f)$ immediately c-precedes the leftmost node in $\phi^{-1}(g)$.

F-precedence depends on c-precedence (Kaplan & Zaenen, 1989). Applying the implicational constraint to (2a), where there is no ADJ immediately f-preceding the embedded SUBJ, the matrix verb *shefa* 'try' contributes an f-structure pronominal to the embedded SUBJ. As such, an overt pronoun cannot appear as the embedded SUBJ; otherwise, the pronoun would introduce a superfluous PRED value to the embedded SUBJ, violating the Uniqueness condition (due to the uniqueness of PRED values). This explains why copy control is not viable in (2a). On the other hand, in (2b), where there is COMP ADJ immediately f-preceding COMP SUBJ, the negative condition of the implicational constraint is not satisfied. This means *shefa* 'try' does not supply an f-structural pronominal to the embedded SUBJ to conflict with the PRED value of an overt pronominal controllee. Thus, copy control is viable in (2b). On the other hand, whenever the controllee COMP SUBJ is not overt (i.e., the embedded subject remains unexpressed Ø such as (2b)), since f-precedence relies on c-precedence and Ø is absent in the c-structure, the criterion of $(\uparrow(\text{COMP})\ \text{ADJ} \in) <_{\text{f.immediate}} (\uparrow\text{COMP SUBJ})$ is not satisfied. This in turn means that the negative implicational condition $\neg[(\uparrow(\text{COMP})\ \text{ADJ} \in) <_{\text{f.immediate}} (\uparrow\text{COMP SUBJ})]$ is satisfied. *Shefa* 'try' supplies an f-structural pronominal as COMP SUBJ, fulfilling the subcategorisation requirement of the embedded verb.

(11) displays the lexical entry of *daibiao* 'represent', which licenses functional control.

(11) *daibiao* 'represent' V

1st line $(\uparrow \text{PRED}) = \text{'REPRESENT<SUBJ, OBJ, XCOMP>'}$

2nd line $(\uparrow \text{SUBJ}) = (\uparrow \text{XCOMP SUBJ})$

3rd line $\lambda P.\lambda y.\lambda x.\textit{represent}(x, y, P(x))$:
$[(\uparrow \text{XCOMP SUBJ})_\sigma \multimap (\uparrow \text{XCOMP})_\sigma] \multimap [(\uparrow \text{OBJ})_\sigma \multimap [(\uparrow \text{SUBJ})_\sigma \multimap \uparrow_\sigma]]$

The second line is an f-structure sharing constraint which would rule out any possibility of the embedded SUBJ being realised as a noun phrase or overt pronoun. This is because the noun phrase or overt pronoun, if present, would contribute a superfluous PRED value to the embedded SUBJ, which has been specified via the structure-sharing constraint, leading to a violation of the Uniqueness condition.

3 Partial control with athematic controller (partial raising)

In the LFG literature, there have been varying treatments regarding whether partial control should be modelled as functional control (Asudeh, 2005) or quasi-obligatory anaphoric control (Haug, 2013). Past studies focus on English data with partial-control verbs subcategorising for a thematic controller.

3.1 Empirical data

In Chinese, there are two types of partial-control verbs. The first type (e.g., *zhunbei* 'prepare') behaves in ways similar to English partial-control predicates but with the additional possibility of copy control. I follow Haug (2013) and analyse them as licensing quasi-obligatory anaphoric control, which involves logophoricity where the controllee (logophor) needs to be bound by one of the matrix arguments (logocentre) introduced by the partial-control predicate.[11] The second type (e.g., *xiangyao* 'want', *rang* 'let'), which is my focus here, selects for an athematic OBJ controller, illustrating partial raising, as shown by the following corpus data:

(12) shimaige$_i$ **xiangyao** zhuren$_j$ Ø$_{*i/j+}$ yiqi qu.
Gollum want master together go
hao zhuren yao-bu-yao gen shimaige yiqi qu
good master will-not-will with Gollum together go
'Gollum wants the master to go together. Will the good master go together with Gollum?' (CCL corpus)

(13) muqin aitong-de kuzhe, [zheng xiaoren]$_i$ meiyou
mother sadly-DE cry-DUR Zheng Xiaoren not
rang ta$_j$ Ø$_{*i/j+}$ yiqi zuo
let 3SG together go
'The mother was crying. Zheng Xiaoren didn't let her go together.' (CCL corpus)

(14) shushu$_i$ shuo ta$_j$ jiao ren gei wo jieshao-le
uncle say 3SG ask someone for 1SG introduce-PFV
yi-gei nuhai, Ø$_i$ **rang** wo$_j$ Ø$_{*i/j+}$ jianmian
one-CL girl let 1SG meet
'Uncle said he asked someone to introduce a girl to me and let me meet (with her).'[12] (zhTenTen17 corpus)

The partial coreference in (12), (13), and (14) is enforced by the collective words, *yiqi* 'together' and *jianmian* 'meet'. For these partial-raising verbs, the athematic status of their OBJ can be supported by standard theta-role diagnostics:

[11] See Pearson (2013) for the required perspective-sensitive diagnostic to detect logophoricity.
[12] This example sentence also involves discourse pro-drop where the first Ø refers to *shushu* 'uncle'.

(15) Semantic entailment test (sentence a does not entail sentence b)
a. xiaoming **xiangyao** zhangsan qu yingguo
Xiaoming want Zhangsan go UK
'Xiaoming wants Zhangsan to go to the UK.'
b. xiaoming **xiangyao** zhangsan
Xiaoming want Zhangsan
'Zhangsan wants Zhangsan.'

(16) Semantic restriction test (non-raising *jiao* 'ask' vs raising *rang* 'let')
a. #xiaoming jiao bingkuai ronghua
Xiaoming ask ice melt
'#Xiaoming asks the ice to melt.'
b. xiaoming **rang** bingkuai ronghua
Xiaoming let ice melt
'Xiaoming lets the ice melt.'

The effects witnessed in (15) and (16) are attributed to the fact that *xiangyao* 'want' and *rang* 'let' in complementation structures do not assign a theta role to their OBJ. In (15), *Xiaoming wants Zhangsan to go to the UK* does not entail that *Xiaoming wants Zhangsan* – only the latter but not the former assigns a theta role to *Zhangsan*. In(16a), *jiao* 'ask' assigns theta role to its object, requiring it to be an animate (or sentient) entity. *Bingkuai* 'ice' does not fulfil such requirements, rendering (16a) semantically anomalous. On the other hand, *rang* 'let' does not impose such semantic restrictions on its object. Thus, (16b) is semantically well-formed.[13] For more details about the set of theta-role diagnostics tailored for Chinese matrix verbs, one may refer to Lam (2023).

Before moving on to the formal analysis, note that a number of past studies on English data (e.g., Pearson, 2016; Landau, 2000) claim that partial raising is not possible, as illustrated in (17):

(17) a. *John seems to live together.
b. *John is likely to go on vacation together.
c. *John appears to be a team. (Pearson, 2016: 721)

While the position against partial raising appears to represent the current mainstream perspective in the study of control, this position was once challenged by Bowers (2008: 140) with data such as the following:

[13] Huddleston and Pullum (2002: 1234-1235) have provided a discussion regarding why English permissives (e.g., *let*, *permit*, *allow*) should be analysed as subcategorising for a raised object. Their argumentation can be extended to Chinese permissives.

(18) a. The chair is not likely to meet more than once a week.
b. This chair seems to meet whenever he feels like it.
(Bowers, 2008: 140)

While one may attribute the different attitudes towards English partial raising to inter-speaker variation, it is also important to acknowledge the delicate nature of (English) partial coreference, which generally requires more contextual support to obtain better acceptability among native speakers (Haug 2013; see also White and Grano 2014). As pointed out by Haug (2013), among others, the acceptability of partial control improves if the context offers a salient plurality; for example, the *chair* in Bowers's (2008: 140) data in (18) can prime a group or committee, whereas no such salient plurality is present in Pearson's (2016: 721) data in (17). In other words, partial raising may be possible in English, provided that there is a plausible context containing a salient plurality. Putting aside the debate on English data, partial raising with an athematic OBJ controller should be regarded as acceptable in Chinese, as evidenced by the corpus data in (12), (13), and (14). The next question is how we may formally model this coreferential relationship.

3.2 Formal analysis of partial raising

I propose that functional control be adopted to model partial raising. My decision is based on two reasons. The first reason is a theory-internal one. As discussed in section 2.2, when it comes to raising, anaphoric control is not appropriate due to the violation of the Coherence condition, where the PRED-bearing controller has no means to take on an argument function. In contrast, this formal issue would not arise if functional control were adopted. This is because although the PRED-bearing controller is not an argument of the local predicate, f-structure sharing allows it to be an argument function of the embedded predicate, thus preserving the Coherence condition. The second reason is based on a language-specific distributional fact: these partial-raising predicates also resist copy control, clustering with other functional-control verbs we have established in section 2:

(19) xiaoming$_i$ **rang**/**xiangyao** zhangsan$_j$ (meifeng xingqisan
Xiaoming let/want Zhangsan every Wednesday
fangxue yihou) {Ø$_{*i/j+}$|*ta} yiqi bangzhu lisi
after.school after 3SG together help Lisi
'Xiaoming lets/wants Zhangsan (to) help Lisi together every Wednesday after school.'

(20) shows the lexical entry of *rang* 'let' as one of the possible ways for modelling partial raising with an athematic OBJ.

(20) *rang* 'let' V

1st line (↑ PRED) = 'LET<SUBJ, XCOMP>OBJ'

2nd line (↑ OBJ) = (↑ XCOMP SUBJ)

3rd line $\lambda x.\lambda P.\lambda y.\exists z.\mathit{let}(x, P(z)) \wedge y \sqsubseteq z$:

$(\uparrow \text{SUBJ})_\sigma \multimap [[(\uparrow \text{XCOMP SUBJ})_\sigma \multimap (\uparrow \text{XCOMP})_\sigma] \multimap [(\uparrow \text{OBJ})_\sigma \multimap \uparrow_\sigma]]$

In the meaning constructor, there is a subsumption operator, specifying that the controller is either semantically the same as or part of the controllee. This approach resembles Asudeh's (2005: 504) treatment of the partial-control verb *prefer*, which selects for a thematic controller:

(21) Meaning constructor of *prefer* (Asudeh, 2005: 504)

$\lambda x.\lambda P.\exists y.\mathit{let}(x, P(y)) \wedge x \sqsubseteq y$:

$(\uparrow \text{SUBJ})_\sigma \multimap [(\uparrow \text{XCOMP SUBJ})_\sigma \multimap (\uparrow \text{XCOMP})_\sigma] \multimap \uparrow_\sigma$

However, different from *prefer*, in the meaning constructor of *rang* 'let', since the controller is athematic, it does not appear as an argument of the *rang* 'let' function on the meaning side of the constructor. Admittedly, at first sight, this treatment may appear unconventional. However, it does allow us to obtain a valid semantic representation of a *rang* 'let' construction after semantic derivation. To illustrate, (22) is an example sentence, (23) is its labelled f-structure, (24) contains its meaning-constructor premises, and (25) displays the semantic derivation.[14]

(22) xiaoming$_i$ **rang** xiaomei$_j$ Ø$_{*i/j+}$ yiqi gongzuo
Xiaoming let Xiaomei together work
'Xiaoming lets Xiaomei work together.'

(23)

$$\begin{bmatrix} \text{PRED} & \text{'LET<SUBJ, XCOMP>OBJ'} \\ \text{SUBJ} & [d]\begin{bmatrix}\text{PRED} & \text{'XIAOMING'}\end{bmatrix} \\ \text{OBJ} & [c]\begin{bmatrix}\text{PRED} & \text{'XIAOMEI'}\end{bmatrix} \\ [s] & \\ \text{XCOMP} & [m]\begin{bmatrix}\text{PRED} & \text{'WORK<SUBJ>'} \\ \text{SUBJ} & \\ \text{ADJ} & \left\{\begin{bmatrix}\text{PRED} & \text{'TOGETHER'}\end{bmatrix}\right\}\end{bmatrix} \end{bmatrix}$$

[14] I have simplified the meaning of *work together* as λx.work.together(x) since how Glue Semantics handles modification is not at issue here.

(24) Meaning-constructor premises

[let] $\lambda x.\lambda P.\lambda y.\exists z.\mathit{let}(x, P(z)) \wedge y \sqsubseteq z : d_\sigma \multimap [[c_\sigma \multimap m_\sigma] \multimap [c_\sigma \multimap s_\sigma]]$

[Xiaoming] $\mathit{Xiaoming} : d_\sigma$

[Xiaomei] $\mathit{Xiaomei} : c_\sigma$

[work.together] $\lambda x.\mathit{work.together}(x) : c_\sigma \multimap m_\sigma$

(25) Semantic derivation

[Xiaoming-let] $\lambda P.\lambda y.\exists z.\mathit{let}(\mathit{Xiaoming}, P(z)) \wedge y \sqsubseteq z : [c_\sigma \multimap m_\sigma] \multimap [c_\sigma \multimap s_\sigma]$

[Xiaoming-let], [work.together] $\vdash \lambda y.\exists z.\mathit{let}(\mathit{Xiaoming}, \mathit{work.together}(z)) \wedge y \sqsubseteq z : c_\sigma \multimap s_\sigma$

[Xiaoming-let], [work.together], [Xiaomei] $\vdash$

$\exists z.\mathit{let}(\mathit{Xiaoming}, \mathit{work.together}(z)) \wedge \mathit{Xiaomei} \sqsubseteq z : s_\sigma$

The final outcome of the semantic derivation states that there exists an entity *z* which is the argument of *work.together*, and it is either that *z* is the same as *Xiaomei* or *Xiaomei* is part of the entity *z*. The former refers to the meaning when *rang* 'let' is used outside a partial-coreference context. In the latter situation, *z* is conceived as a group – a semantically plural entity, capturing the partial-coreference reading. The final outcome is thus a valid semantic representation of the *rang* 'let' construction. An advantage of this approach is that it allows semantic flexibility of the controllee, which can either be in an inclusion or equality relation with the controller. This is in line with the behaviour of partial-control predicates which resemble exhaustive-control predicates when there is no collective word (or plural context) to license partial-control readings (see also Haug 2013; Asudeh 2005).

Before ending this section, I display a possible lexical entry of the non-raising partial-control verb *zhunbei* 'prepare' in (26) as a comparison:

(26) *zhunbei* 'prepare' V

1st line (↑ PRED) = 'PREPARE<SUBJ, COMP>'

2nd line $\lambda x.\lambda K.[\, e \mid \mathit{prepare}(e, x, \mathsf{bind}(e, K)]: (\uparrow \text{SUBJ})_\sigma \multimap [(\uparrow \text{COMP})_\sigma \multimap \uparrow_\sigma]$

3rd line $\neg[(\uparrow(\text{COMP})\ \text{ADJ} \in) <_{\text{f.immediate}} (\uparrow \text{COMP SUBJ})]$

$\Rightarrow (\uparrow \text{COMP SUBJ PRED}) = \text{'PRO'} \wedge \lambda P.[\underline{x}_1 \mid\ ]; P(\underline{x}_1): \forall H.[(\uparrow \text{COMP SUBJ})_\sigma \multimap H] \multimap H$

Following Haug (2013), quasi-obligatory anaphoric control is adopted for *zhunbei* 'prepare'. Its meaning constructor in the second line assumes a Davidsonian event representation and a formally defined relation bind to capture logophoric

binding.[15] Both Glue Semantics and PCDRT are involved in the meaning constructor to explicitly model the syntax-semantics-discourse interfaces.

4 Conclusion

This paper has focused on two complement-control phenomena in Mandarin Chinese, namely copy control and partial raising. For copy control, the data have been examined to draw conclusions regarding the behaviour of the overt controllee, including its licensing condition, how it differs from resumptive and intrusive pronouns in the cross-linguistic literature, and how its behaviour should be formally modelled. It has been pointed out that copy control helps to draw a dividing line between functional-control equi verbs and anaphoric-control equi verbs in Mandarin Chinese. This brought out the important role of language-specific evidence in determining model-theoretical control mechanisms in the formal grammar of a language. As for partial raising, it has been shown that Mandarin Chinese allows partial raising with an athematic OBJ. This has challenged the current view in the general control literature that conceives of partial raising as an impossible construct. A formal solution is explored using a machinery of functional control. Overall, this paper has presented two empirical phenomena discussed by Lam (2023).

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[15] See Haug (2013) for the formal definition of bind.

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