Complement control at syntax-semantics-discourse interfaces:
An investigation of Mandarin Chinese

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Mandarin Chinese is a discourse pro-drop language, where subjects and objects can generally be unexpressed when they are contextually retrievable. Despite divergent theoretical implementations, several influential studies (e.g., Grano, 2015; Huang, 1984) similarly argue for a generalised framework of control for Chinese, where discourse pro-drop is integrated into some control mechanism. Taking on a similar position, my PhD project is an empirically oriented investigation, including detailed classifications of Chinese control predicates:

(i) Empirical-Tier classification:
For each control predicate, diagnostics are applied to detect the referential properties of its controllee. The predicates are divided into two broad types, depending on the interpretation of its controllee: obligatory control vs non-obligatory control. Under obligatory control are three control sub-types: exhaustive control, partial control, and split control. Under non-obligatory control is arbitrary control (discourse pro-drop). Although these control types resemble those found in the cross-linguistic literature (Landau, 2000, 2013; Stiebels, 2007), my classification also takes into account language-specific properties of Chinese (e.g., discourse pro-drop).

(ii) LFG-Tier classification:
Building on the Empirical Tier, the LFG Tier formally model Chinese control relations. Following Dalrymple et al. (2019), it integrates LFG with Glue Semantics and Partial Compositional Discourse Representation Theory (PCDRT; Haug, 2014). Motivated by the detailed empirical properties of Chinese complement control, the investigation refines Dalrymple et al.'s (2019: 545-601) four-way model-theoretic typology of control:

	Refinement (Sub-variants)
Functional Control	Functional Control for Raising Predicates
	Functional Control for Equi Predicates Disallowing Copy Control
	Functional Control for Partial-Control Predicates with Athematic Controllers
Obligatory Anaphoric Control	Obligatory Anaphoric Control for Equi Predicates with Copy Control
	Obligatory Anaphoric Control for Obligatory Split Antecedency
	Obligatory Anaphoric Control for Split Antecedency and Control Shift
Arbitrary Anaphoric Control	Arbitrary Anaphoric Control for Discourse Pro-drop
Quasi-obligatory Anaphoric Control	Quasi-obligatory Anaphoric Control for Partial Control with Thematic Controllers

My talk will highlight a few findings arising from the LFG-Tier classification. The findings have implications for LFG's general control mechanisms. Before then, note that my analysis assumes a grammar-wide optional constraint for all Chinese predicates to deal with subject pro-drop:

$$((\uparrow \text{SUBJ PRED}) = \text{'PRO'} \land \lambda P.[x\,|\;]; P(x): \forall H.[(\uparrow\text{SUBJ})_\sigma \multimap H] \multimap H)$$

Finding 1: Copy Control and two classes of equi predicates

There has been a debate regarding whether equi predicates should be modelled as Functional Control (e.g., Asudeh, 2005; Bresnan, 1982) or (Obligatory) Anaphoric Control (e.g., Dalrymple et al., 2019). There is little discussion about the potential of a language to possess both classes of equi. I argue that Chinese is one such language having both classes of equi: one exhibiting Functional Control, while the other Obligatory Anaphoric Control. For languages with a rich case marking system, this distinction may be signalled by the case makers. Although Chinese lacks case marking, I argue that the two equi classes are differentiated by their ability of licensing "Copy Control". In Chinese Copy Control, as noticed by e.g., Hu et al. (2001) and Grano (2015), the controllee is replaced by an overt resumptive pronoun (as the embedded subject of the complement clause) sharing the same reference as the controller under the condition that there is an intervening adverbial between the predicate and the controllee (Ø):

(1) xiaoming$_i$ shefa [jintian xiawu   san-le   hui   yihou] {Ø$_{i/*j}$| ta$_{i/*j}$} yigeren   lai
    Xiaoming try   today afternoon be.over-PFV meeting after   3SG by.oneself come
'Xiaoming had better try to come by himself this afternoon after the meeting is over.'   (Grano, 2015: 145)

Given the general analysis that a functionally controlled embedded subject should not be expressed, I take this pattern as evidence that the control mechanism of these equi predicates is anaphoric in nature. In contrast, some equi predicates have been identified to resist Copy Control, e.g., *daibiao* 'represent', which is an equi verb in Chinese:

(2) xiaoming$_i$ daibiao   xuexiao$_j$ [zai mingtian   fangxuehuo] {Ø$_{i/*j}$|*ta} canjia   bisai
    Xiaoming represent school   at tomorrow after.school   3SG participate competition
    lit: Xiaoming represents the school to participate in the competition tomorrow after school

For those equi predicates which resist Copy Control, I posit that their control mechanism is functional rather than anaphoric. (3) is an Obligatory-Anaphoric-Control equi, whereas (4) is a Functional-Control equi:

(3) *shefa* 'try' V

1st line ($\uparrow$ PRED) = 'TRY<SUBJ, COMP>'

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

3rd line $\lambda x.\lambda P.[\mid try(x, P)]$: ($\uparrow$ SUBJ)$_\sigma$─∘[($\uparrow$ COMP)$_\sigma$─∘ $\uparrow_\sigma$]

4th line ¬[($\uparrow$(COMP) ADJ $\in$) $<$$_{f.immediate}$ ($\uparrow$COMP SUBJ)] $\Rightarrow$ ($\uparrow$ COMP SUBJ PRED) = 'PRO' $\wedge$

$\lambda P.[x_1 \mid$]; $P(x_1)$: $\forall$H.[($\uparrow$COMP SUBJ)$_\sigma$─∘H]─∘ H

(4) *diabiao* 'represent' V

($\uparrow$ PRED) = 'REPRESENT<SUBJ, OBJ, XCOMP>'

($\uparrow$ SUBJ) = ($\uparrow$ XCOMP SUBJ)

$\lambda P.\lambda y.\lambda x.represent(x, y, P(x))$: [($\uparrow$ SUBJ)$_\sigma$ ─∘ ($\uparrow$ XCOMP)$_\sigma$] ─∘ [($\uparrow$ OBJ)$_\sigma$ ─∘ [($\uparrow$ SUBJ)$_\sigma$ ─∘ $\uparrow_\sigma$]]

This 4th constraint in (3) is used to impose the condition for Copy Control. The constraint adopts the concept of "immediate f-precedence" defined in (5):

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

If an adverbial does not immediately f-precede an embedded subject, then Copy Control is not viable, which means that the matrix predicate contributes an f-structural pronominal (together with its meaning constructor). The negative constraint can be satisfied when there is no such an adverbial. On the other hand, the f-structure sharing constraint in (4) rules out any possibility of the embedded SUBJ being realised as an overt resumptive pronoun, which would contribute a superfluous PRED value to the embedded SUBJ attribute, violating the Uniqueness condition.

Finding 2: Functional Control for partial control with athematic controller
Since Haug (2013), there is a tendency to model partial control with Quasi-obligatory Anaphoric Control, which is intended to supersede an earlier Functional-Control proposal by Asudeh (2005). Nevertheless, I have identified a group of Chinese predicates (e.g., *xiangyao* 'want', *rang* 'let'), which license partial control with an athematic object controller. Standard theta-role tests have been employed to ascertain their athematic properties. (6) is a corpus example of *rang* 'let' in a partial-control context enforced by the collective word *yiqi* 'together':

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

Anaphoric Control is not appropriate because an athematic pronominal carrying a PRED value would cause problems for the Coherence condition:

(7) All governable functions present in an f-structure must occur in the value of a local PRED attribute. All functions that have a PRED value must have a theta role.   (Version of Börjars et al., 2019: 22)

(8) shows the lexical entry of *rang* 'let'. In the meaning constructor, there is a subsumption operator, specifying that the controller is either semantically the same as or part of the controllee (see also Asudeh, 2005: 504). Since the controller is athematic, it would not appear as an argument of the *let* function on the meaning side.

(8) *rang* 'let' V

($\uparrow$ PRED) = 'LET<SUBJ, XCOMP>OBJ'

($\uparrow$ OBJ) = ($\uparrow$ XCOMP SUBJ)

$\lambda x.\lambda P.\lambda y.\exists z.let(x, P(z)) \wedge y \sqsubseteq z$: ($\uparrow$ SUBJ)$_\sigma$ ─∘ [[($\uparrow$ XCOMP SUBJ)$_\sigma$ ─∘ ($\uparrow$ XCOMP)$_\sigma$] ─∘ [($\uparrow$ OBJ)$_\sigma$ ─∘ $\uparrow_\sigma$]]

As an example, consider the sentence: *xiaoming rang Xiaomei yiqi gongzuo* 'Xiaoming lets Xiaomei work together'. After semantic derivation, it is represented as: $\exists z.let(Xiaoming, work.together(z)) \wedge Xiaomei \sqsubseteq z$. The existence of this class of predicates means that the empirical landscape of partial control is wider than what past studies suggest. To capture the cross-linguistic variation, both Asudeh's (2005) and Haug's (2013) proposals are required. These predicates also constitute counter evidence to e.g., Pearson (2016), where partial raising is considered impossible.

Finding 3: Implicit control and object drop
For those Chinese complementation verbs which select for an OBJ, some (but not all) allow their OBJ to be unexpressed. When this occurs, there are two instances of unexpressed GFs. (9) is a *guli* 'encourage'-construction, which contains an optionally unexpressed OBJ and an obligatorily unexpressed SUBJ.

(9) xiaoming$_i$ guli {xiaomei$_j$ | Ø$_{*i/j}$} Ø$_j$ duo dushu
    Xiaoming encourage Xiaomei more read
    'Xiaoming encourages (Xiaomei) to read more.'

I focus on the optionally unexpressed OBJ, whose reference cannot be completely identical to the matrix SUBJ. Further empirical complexities arise from the fact that, when OBJ is unexpressed, (9) does not exclude the reading where the referents of the matrix SUBJ and the unexpressed OBJ are in an "inclusive" relation. (9) can be used to mean that *Xiaoming encourages everyone (including himself) to read more*, which is known as "non-specific" reading. I posit (10) to be the lexical entry of *guli* 'encourage', omitting the coreferential constraints for the unexpressed embedded SUBJ. For the use of $R*$, see Dalrymple et al. (2018).

(10) *guli* 'encourage' V

1st line ($\uparrow$ PRED) = 'ENCOURAGE <SUBJ, OBJ, COMP>'

2nd line (($\uparrow$ OBJ PRED) = 'PRO'

$\wedge$ { $\lambda P.[x_1 |]; P(x_1) : \forall H.[(\uparrow$ OBJ$)_\sigma$ ─∘H] ─∘ H

| $\lambda P.[| | [|person(x_1)] \Rightarrow [x_1 |]; P(x_1)] : \forall H.[(\uparrow$ OBJ$)_\sigma$ ─∘H] ─∘ H}

$\wedge$ $R*((\uparrow$OBJ$)_\sigma$ INDEX) $\neq R*((\uparrow$SUBJ$)_\sigma$ INDEX))

3rd line $\lambda x.\lambda y.\lambda P.[|encourage(x, y, P)] : (\uparrow$ SUBJ$)_\sigma$ ─∘ [($\uparrow$ OBJ$)_\sigma$ ─∘ [($\uparrow$ COMP$)_\sigma$ ─∘ $\uparrow_\sigma$]]

The 2nd line contains two optional meaning constructors for the pronominal OBJ (when it is unexpressed). The second option has a quantifying scope to model the "non-specific" reading. (11) contains two DRSs arising from these two options, exemplifying two possible readings in the context of *Zhangsan is happy*, which supplies the contextual entity *Zhangsan* as a possible antecedent for one of the readings:

(11)
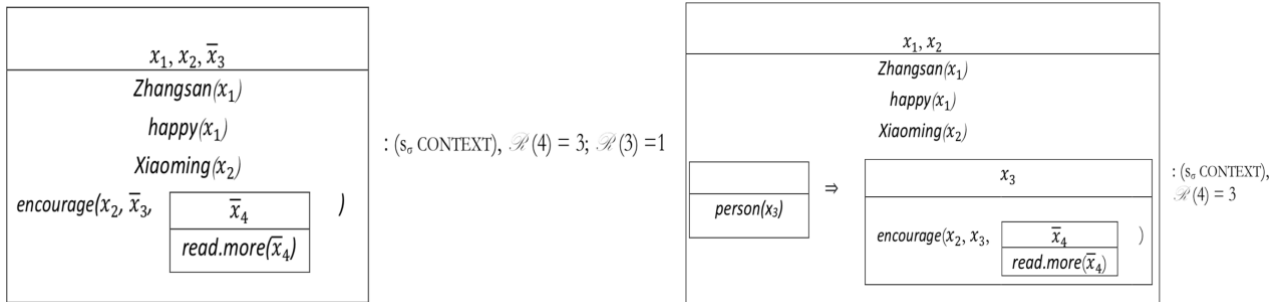
In both readings, the unexpressed OBJ must not be completely identical to the embedded unexpressed SUBJ, as required by the negative referential constraint.

Conclusion

The majority of past studies on Chinese control adopt a derivational framework. This talk will present the first study on Chinese complement control that utilises the framework of LFG+Glue+PCDRT to model coreference resolution pertaining to syntax-semantics-discourse interfaces. Through an in-depth empirical investigation, my talk will highlight intriguing patterns, which have not hitherto been reported in the existing LFG literature, and explore their respective formal solutions, which have implications for LFG's general control mechanisms.

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