Quantificational binding without surface c-command in Mandarin Chinese

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1. Introduction

Studies of pronominal anaphora in generative grammar have long recognized, at least since the early 1970s, a distinction between pronouns with referential antecedents and those construed with quantificational NPs, as illustrated in (1)-(2) respectively:[1]

(1) a. John$_i$ likes his$_i$ teacher.
b. The old lady$_i$ said that she$_i$ won a lottery.

(2) a. Every man$_i$ put a screen in front of him$_i$.
b. No child$_i$ will admit that he$_i$ is sleepy.

In both (1a) and (1b), a pronoun is in co-reference with its antecedent. But in (2) the pronoun corresponds more closely to a logician's use of bound variables. The LF representations of (2a-b) after Quantifier Raising (QR, May 1977) are (3a-b), respectively.

(3) a. LF: Every man$_i$ [$_{IP}$ t$_i$ [$_{VP}$ put a screen in front of him$_i$]]
b. LF: No child$_i$ [t$_i$ will admit that [he$_i$ is sleepy]]

The pronoun in each representation above is construed as a bound variable whose reference co-varies with the value assigned to the trace *t*, itself a variable bound by the raised quantificational NP (Q-NP).

It has been widely assumed, especially since Reinhart (1983a,b), that quantificational binding as illustrated by (2) requires surface c-command (also see Partee (1978/2004) and Evans (1977, 1980). Some supporting examples for this assumption involve examples of the following kind.

(4) a. Every man$_i$ walked out. He$_{*i}$ slammed the door.
b. John loves every woman, and he hopes to date her$_{*i}$ soon.
c. If no student$_i$ cheats on the exam, he$_{*i}$ will pass the course.

[1] The examples in (2) are taken from Partee (1978/2004). See this and Evans (1980) for a good survey of the distinction between the referential and bound variable uses of pronouns.

d. The secretary who works for him$_{*i}$ despises each$_i$ of the managers.

By contrast, Postal (1971), Wasow (1972), Higginbotham (1980a, 1983), Huang (1982, 1994, 2010), Bresnan (1994, 1998), Barker (2005, 2009), Shan and Barker (2006), among many others, have provided examples showing that quantificational binding does not require surface c-command. One such example is (5) discussed in Huang (1994:144).

(5) The election of no president will please his or her opponents.

Significantly, the pronoun *his*/*her* in (5) related to 'no president' must be a bound variable pronoun rather than an e-type pronoun, because 'no president' does not refer.

More recently, along the same lines of the above authors, Barker (2012) argues that Q-NPs are actually capable of binding out of containers of essentially any syntactic category, as illustrated by the following examples many of which are earlier observations from the previous literature.

(6) Possessors:
a. [Everyone$_i$'s mother] thinks he$_i$'s a genius.
b. [No one$_i$'s mother in law] fully approves of her$_i$.

(7) Inverse Linking:
[Someone from every$_i$ city] hates it$_i$

(8) Binding out of nominal arguments:
This shows that [the fate of every$_i$ individual] is decided by his$_i$ inner ego.

(9) Binding out of PP:
Our staff keeps a watchful eye [on every$_i$ situation] and on it$_i$'s development.

(10) Binding out of VP:
a. We [will sell no$_i$ wine] before its$_i$ time.
b. A book [was given to every$_i$ boy] by his$_i$ mother. (Harley 2003: 64)

(11) Binding out of an adjunct
…[after seeing each$_i$ animal] but before categorizing it$_i$ on the computer or recording it$_i$ on their response sheet.

(12) Binding out of a tensed clause: a universal does not take scope outside of a tensed clause as in (12a), but *each* can.

a. *[That Mary seems to know every$_i$ boy] surprised his$_i$ mother.

b. The grade [that each$_i$ student receives] is recorded in his$_i$ file.

Given examples like the above, Barker speculates that the impression to the surface c-command requirement may be an illusion of the fact that "in predicate logic, a quantifier takes scope over exactly the proposition it is adjoined to". This scope requirement, however, should be an LF requirement because in natural language the scope of a quantifier can be different from its surface c-command domain, as the ambiguity of (13) shows.

(13) Someone loves everyone.

a. Some person x is such that x loves everyone. (scope: $\exists > \forall$)

b. Every person x is such that someone loves x. (scope: $\forall > \exists$)

When (13) is construed as (13b), *everyone* has scope over *someone*, permitting the individual denoted by someone to vary with the individual picked for *everyone*. In this construal, the actual scope of *everyone* at LF is different from its surface c-command domain.

Since Q-NPs obtain their scope at LF, in order for a pronoun to be construed as a bound variable, it must be within the scope of the quantifier that binds it at LF (but not necessarily at surface structure). Given this requirement, Barker argues that the contrast between (14a) and (14b) is not an argument for the surface c-command requirement for quantificational binding because the pronoun in (14b) is not within the scope of the quantificational expression '*each woman*' at LF (though he does not explain why).

(14) a. Each woman denied that she met the shah.

b. The man who travelled with each woman$_i$ denied that she$_{*i}$ met the shah.

Unlike English quantificational binding, quantificational binding in Chinese has not received much attention. This article attempts to fill this gap with an eye to investigating constraints on scope-taking of Q-NPs and the interaction between scope taking and quantificational binding. In particular, we will focus on examples where Q-NPs do not c-command the pronouns bound by them at surface structure. We will refer to such quantificational binding as QBWC. This article is organized as follows. Section 2 briefly reviews QBWC in the previous literature. Section 3 is a preliminary

attempt to account for the previous observations. Section 4 refutes the preliminary attempt by pointing out some counterexamples which are not compatible with the predictions of the preliminary attempt. Section 5 and 6 establish QBWC as a scope phenomenon and discuss the interaction between scope ambiguity and QBWC. Section 7 is devoted to weak crossover situations, demonstrating how reconstruction, non-coreference and Chomsky's Leftness Condition or Bianchi's reformulation of it as a pure antic-command condition to account for a complex set of data. Section 8 concludes the discussion and points out some residual problems.

2. The Case of Chinese: Previous literature

There are very few works specifically focusing on bound pronouns in Mandarin Chinese, but Huang's (1982) early example in (15) already shows that quantificational binding in Chinese does not require surface c-command.[2]

(15) Binding out of a relative clause (Huang (1983:73; 1982:409))

[$_{DP}$ [$_{CP}$ Mei-ge ren$_i$ shoudao de] xin] shangmian] dou you ta$_i$ taitai de
every-Cl person receive Rel letter top all have his wife DE
mingzi
name
'Letters that everyone$_i$ received have his$_i$ wife's name on top of them.'

The most detailed discussion of quantificational binding without c-command in Mandarin Chinese was provided by Jin (1998). She discovered a subject/object asymmetry, claiming that subject universal NPs inside an embedded clause may bind a pronoun in the main clause without c-commanding it, whereas universal object NPs may not do so. This is illustrated by the following examples taken from her.

(16) a. [Mei-ge ren$_i$ baoming hou], Zhangsan dou hui zai shi tian
every-Cl person register after Zhangsan all will within ten day
ne zhao ta$_i$ shou qian
within find him collect money
'After everyone$_i$ has registered, Zhangsan will collect the money from him$_i$.'

b. *Zhangsan xunwen mei-ge ren$_i$ hou, Lisi hui yao ta$_i$ zuo ge jueding
Zhangsan ask every-Cl person after Lisi will want him make Cl decision

[2] Aoun and Li (1990) discusses bound pronouns in Mandarin Chinese but their focus is not on quantificational binding without c-command.

'After Zhangsan asked everyone$_i$, Lisi will want him$_i$ to make a decision.'

(17) a. Ruguo mei-ge ren$_i$ ken nuli, ta$_i$ jiu yiding hui chenggong
if every-Cl person willing work.hard he then definitely will succeed
'If everyone$_i$ is willing to work hard, he$_i$ will definitely succeed.'
b. *Ruguo ni ai mei-ge ren$_i$, ta$_i$ yiding hui hen gaoxing
if you love every-Cl person he definitely will very happy
'If you love everyone$_i$, he$_i$ will definitely be very happy.'

(18) a. Mei-ge lüke$_i$ rujing zhiqian, haiguan yiding dou hui jiancha ta$_i$-de
every-Cl traveler enter before customs definitely all will examine his
xingli
luggage
'Before every traveler$_i$ enters, the customs will definitely examine his$_i$ luggage.'
b. *Zai laoshi yuetan meige xuesheng$_i$ zhiqian, banzhang dou hui
at teacher arrange.talk every student before class.leader all will
yao ta$_i$ zuohao zhunbei gongzuo
want him do.well preparation work
'Before the teacher talks with every student$_i$, the class leader will ask him$_i$ to prepare well.'

(19) a. Buguan mei-ge ren$_i$ yuan bu yuanyi, you yi tian ta$_i$ dou hui
no.matter every-Cl person willing not willing have one day he all will
likai renjian
leave the world
'No matter whether everyone$_i$ is willing, he$_i$ will leave the world one day.'
b. *Buguan ni xi bu xihuan mei-ge ren$_i$, wo dou hui qing ta$_i$ lai
no.matter you like.not.like every-Cl person I all will invite him come
'No matter whether you like or dislike everyone$_i$, I will invite him$_i$ to come.'

In what follows, we shall refer to the above observed asymmetry as Jin's generalization.

3. A Preliminary First Attempt to Account for QBWC in Chinese

Jin's discussion of QBWC reminds us of Huang's (1982) and Teng's (1985) early discussions of referential pronominal anaphora in Chinese because the subject/object asymmetry for the QBWC discovered by her looks quite similar to the subject/object

asymmetry of pronominal anaphora discussed by Huang (1982) and Teng (1985).

In English both forward and backward pronominalization are allowed in a complex sentence, as illustrated by (20).

(20) a. When John visited me, he gave me a gift that I had long wanted to buy.
b. When he visited me, John gave me a gift that I had long wanted to buy.

However, Huang (1982, 1998) observed that though failure of a pronoun to c-command an NP may be sufficient for a pronoun to be coreferential with a NP in English (Reinhart 1976), this is not the case in Chinese. For example, the pronoun in (21a) is embedded to a sentential subject, hence not c-commanding the proper name *Zhangsan* in the matrix VP, but the former cannot be coreferential with the latter.

(21) a. *[Ta$_i$ neng-bu-neng lai] dui Zhangsan$_i$ mei guanxi
he can-not can come to Zhangsan no matter
'Whether he$_i$ can come or not doesn't matter to Zhangsan$_i$.'
b. [Zhangsan$_i$ neng-bu-neng lai] dui ta$_i$ mei guanxi
Zhangsan can-not-can come to him no matter
'Whether Zhangsan$_i$ can come or not doesn't matter to him$_i$.'

Huang (1982) also observed that when the pronoun *ta* in (21a) is further embedded (with no change in linear relation with the antecedent *Zhangsan*), coreference becomes possible:

(22) [[Ta$_i$ de mama] neng-bu-neng lai] dui Zhangsan$_i$ mei guanxi
he DE mother can-not-can come to Zhangsan no matter
'Whether or not his$_i$ mother can come does not matter to Zhangsan$_i$.'

This suggests that the impossibility of coreference between the pronoun and the proper name *Zhangsan* in (21a) is not due to linear precedence. Instead, he proposed a hierarchical condition on Chinese pronominal anaphora in terms of the notion 'cyclic c-command', as defined below.

(23) Condition on Pronominal Anaphora in Chinese (Huang 1998:280)
A pronoun may not cyclic c-command its antecedent.[3]

[3] 'A pronoun' here means 'an overt pronoun'. With a null pronoun (*pro*), (21a) is quite good:
(i) [*pro* neng-bu-neng canjia biyedianli] dui Zhangsan bu zhongyao.
can-not-can join commencement to Zhangsan not important
'Whether or not he can participate in the commencement is not important to Zhangsan.'

(24) Cyclic c-command (Huang 1998: 279)

A cyclic c-commands B if and only if:

a. A c-commands B, or

b. If C is the minimal cyclic node (NP or S') that dominates A but is not immediately dominated by another cyclic node, then C c-commands B.[4]

In (21a), the pronoun *ta* does not c-command *Zhangsan*, but its containing sentential subject c-commands it with C (of 24b) = S' (= CP). Therefore, (21a) is ill-formed in violation of (23), with *ta* cyclic-c-commanding its antecedent. On the other hand, in (22), neither *ta* nor the minimal cyclic NP/DP containing it, *ta de mama* 'his mother', c-commands *Zhangsan*. So the pronoun does not cyclic-c-command its antecedent, and coreference is allowed.

Huang's (1982) analysis of pronominal anaphora predicts that an object pronoun in an embedded clause may not be coreferential with a proper name in the matrix clause and he provided (25) as evidence for this prediction, marking it as disallowing coreference:

(25) Wo kanjian ta_i de shihou, $Zhangsan_i$ zai dazi
I see him DE time Zhangsan Prog type
'When I saw him_i, $Zhangsan_i$ was typing.'

Huang's judgement of (25), however, was challenged later by Teng (1985) and Zhu (1997). Indeed, we found that many examples of a similar type are acceptable to the native speakers we consulted, for example, (26)-(28) below.

(26) [Wo zheng yao ma ta_i de shihou], $Zhangsan_i$ que xian da dianhua
I be.going to want scold him DE time Zhangsan but first make call
guolai peizui le
come apologize Asp
'At the moment when I was about to scold him_i, $Zhangsan_i$ made a phone call to apologize first.'

The non-coreference rule regulates the relation of an overt pronoun with its (referential) antecedent in Chinese, in a manner to be distinguished from Principle C.

The basic intuition of (23) is that a pronoun in Chinese obeys a stricter condition than the familiar Condition C: it can neither c-command, nor even 'almost' c-command its antecedent.

[4] Intuitively, when one cyclic node immediately dominates another, the higher one counts as the relevant cyclic node; or they together count as one. This idea also runs through the definitions of phase-c-command to be discussed below.

(27) [Yaoshi dajia dou yuanyi zhu ta$_i$ yibeizhili], Daniu$_i$ meiyou bu
if everyone all willing help him with.one.arm.effort Daniu not not
chenggong de daoli
succeed DE reason
'If everyone is willing to help him$_i$, there is no reason that Daniu$_i$ will not succeed.'

(28) [Renjia yuanyi jia gei ta$_i$] jiu yijing shi A-niu$_i$ zui da de fuqi le
she willing marry to him Emp already be A-niu most big DE blessing Asp
'That she$_i$ is willing to marry him is already A-Niu$_i$'s biggest blessing.'

In other words, there exists a subject-object asymmetry with respect to pronominal anaphora in Chinese.

Given Jin's observations of QBWC and Huang-Teng's observations of referential pronominal anaphora, it seems that restrictions on referential pronominal anaphora and quantificational binding exhibit parallel patterns, as summarized below:

(29) a. A universal Q-NP in subordinate subject position can be linked to a bound pronoun in the matrix clause, but a universal Q-NP in subordinate object position can't.[5]
b. A pronoun in subordinate subject position cannot be referentially linked to a proper name (referential NP) in the matrix clause, but a pronoun in

[5] A reviewer observes an interesting contrast between *mei-ge ren* 'everyone' and *henshao ren* 'few people'. According to the reviewer, while *henshao ren* may bind a pronoun in its surface c-command domain, this is not possible when it is in the subject position of an adverbial clause as illustrated below.

(i) Henshao xuesheng xihuan wo ba ta$_i$ de chengji gongbu chulai
few student like I BA his DE grade announce out
'Few studentns like me announcing their grades.'
(ii) *Ruguo henshao xuesheng$_i$ lai xuexiao, ni hui ba ta$_i$ de chengji gongbu chulai ma?
if few student come school you will BA he DE grade announce out Q
'If few students$_i$ come to school, will you announce his$_i$ grade?'
(iii) *Henshao xuesheng$_i$ lai xuexiao de-shihou, ni hui ba ta$_i$ de chengji gongbu chuai ma?
few student come school when you will BA he DE grade announce out Q
'When few students$_i$ come to school, will you announce his$_i$ grade?'

Note that *henduo ren* 'many people' seems to behave like *henshao ren*, as a replacement of the latter with the former leads to the same grammaticality judgement. Given this asymmetry between *mei-ge ren* 'everyone' and *henshao/henduo ren* 'few/many people', we suspect that it is the lexical property of *mei-ge* that has an inherent distributive feature (akin to *each*) that encourages its ability to take wide scope, while *henshao* and *henduo* do not have such a feature and therefore are weaker in their scope-taking power (cf. Lin 1998). We recognize that different quantificational NPs exhibit different lexical properties that lead to their different strengths in scope taking, but we shall focus on the behavior of *mei-ge* in this article.

subordinate object position can.

In other words, the positions where quantificational binding is possible seem to be those where overt pronominal coreference is ruled out. The question is to define a proper domain that is relevant to both quantificational binding and pronominal non-coreference.

In a recent article on binding theory, Bruening (2014) argues that not every node in a tree but only phasal nodes are relevant to the binding theory. In his theory, phasal nodes are CP, vP and DP. vP is the maximal VP projection. Now suppose we define a notion of phase-c-command based on Huang's (1982, 1998) cyclic-c-command as defined in (24). Then the parallel patterns between referential pronominal anaphora and quantificational binding may be accounted for by the two conditions in (31) and (32).

(30) α **phase-c-commands** β iff:

a. α c-commands β, or

b. If γ is the minimal phasal node (=vP, CP, DP) that dominates α but is not immediately dominated by another phasal node, then γ c-commands β.

(31) **Condition on quantificational binding**

A bound-variable pronoun is licit only if it is in the phase-c-command domain of its Q(uantificational)-antecedent (in surface syntax).

(32) **The non-coreference rule** (Principle C')

A pronoun may not be coindexed with an R-expression in its phase-c-command domain.[6]

In other words, what unifies quantificational binding and referential pronominal anaphora might be the notion of a phase-c-command domain.

To illustrate, reconsider the illicit and licit cases in (21a) and (26), both repeated

[6] As mentioned in footnote 3, the non-coreference rule does not apply to empty pronouns, as all the unacceptable cases in violation of (32) in this article become acceptable when the overt pronoun is replaced with a covert one. A detailed investigation of the contrast between overt and covert pronouns will take us too far afield. One way to resolve this question is to say that the non-coreference rule is a kind of Avoid Pronoun effect that causes a stricter restriction than the original Principle C on overt pronouns. That is, the availability of pro precludes the overt pronoun under co-indexation. The reason why the non-coreference rule does not apply to languages such as English might be because English does not allow a pro as an option. There is also a natural question why (32) is specific to Chinese and is not applicable to other languages such as English. It suffices for the purpose of this article to assume that different languages employ a different command relation to instantiate Principle C. For most languages, Principle C is sensitive to "c-command", but for Chinese, it is "phase-c-command" that matters.

below for sake of convenience.

(21a) *[Ta$_i$ neng-bu-neng lai] dui Zhangsan$_i$ mei guanxi
he can-not can come to Zhangsan no matter
'Whether he$_i$ can come or not doesn't matter to Zhangsan$_i$.'

(26) [Wo zheng yao ma ta$_i$ de-shihou], Zhangsan$_i$ que xian da dianhua
I be.going to want scold him when Zhangsan but first make call
guolai peizui le
come apologize Asp
'When I was about to scold him$_i$, Zhangsan$_i$ called to apologize first.'

In (21a), the pronoun is the subject of the embedded sentential subject. The minimal phasal node dominating the pronoun is the embedded subject CP. This CP c-commands the proper name *Zhangsan*. So *Zhangsan* is in the phase-c-command domain of the pronoun. Thus by the non-coreference rule in (32), the pronoun may not be coindexed with *Zhangsan*. By contrast, in (26), the minimal phasal node dominating the pronoun but is not immediately dominated by another phasal node is the vP containing the pronoun. But that vP does not c-command the proper name *Zhangsan*. So co-indexing between the pronoun and the proper name is permitted.

Quantificational binding is reversed to pronominal non-coreference in the sense that we are looking for possible domains of binding rather than non-coreference. As we saw earlier, Jin (1998) claims that when a Q-NP is the object of a transitive verb in a subordinate clause, it is very difficult for a pronoun in the matrix clause to get bound by the Q-NP. The bound variable reading is not permitted because the embedded vP containing the Q-antecedent is a phasal node not immediately dominated by another phasal node and the vP does not c-command the pronoun in the main clause. This explains the ungrammaticality of the (b) examples in (16)-(19). By contrast, when the Q-NP is a subject of an adverbial clause left-adjoined to the matrix clause or a relative clause modifying a subject noun phrase, the minimal phasal node dominating it is the containing subordinate CP or the DP immediately dominating the relative. Since the phasal CP or DP in such configurations c-commands any pronoun to the right in the main clause, quantificational binding is allowed. Jin's generalization is thus captured in a way parallel to constraints on referential pronominal anaphora.

Indeed, this is an attempt that we made to account for QBWC in Huang and Lin (2016) and Lin and Huang (2015, 2018a,b). This attempt is theoretically interesting as it would unify the domains where quantificational binding and referential dependency of pronouns are allowed/disallowed. However, it is a failed attempt, because as we

will show in the next section, the subject/object asymmetry that Jin (1998) claims as a generalization has many counterexamples.

4. Problems of the Preliminary Attempt

One crucial assumption behind this unification is the impossibility for an object universal NP in a subordinate clause to bind a pronoun in the matrix clause. Yet, upon our further investigation, we have encountered many examples that allow quantificational binding in such configurations, contrary to Jin's (1998) original observation. For example, (33)-(39) below all sound acceptable to us and many native speakers we consulted.

(33) Universal NP inside PP and VP of a relative clause

[$_{NP/DP}$[$_{NP/DP}$[$_{CP}$ Laoban [$_{VP}$ xie [$_{PP}$ gei mei-wei yuangong$_i$]] de] qinbi xin]
boss write to every-Cl employee DE personal letter
limian] dou fushang-le yi-zhang yao jiangli ta$_i$ de zhipiao
inside all attach-Asp one-Cl want reward him DE check
'The personal letters that the boss wrote to every employee$_i$ contains a check that was to reward him$_i$.'

(34) Universal NP inside VP of a *when*-clause

[$_{DP}$ [$_{CP}$ [$_{IP}$ Jianchaguan [$_{AspP}$ zai [$_{VP}$ xunwen mei-wei waiji xianyifan]]]] de
prosecutor Prog interrogate every-Cl foreign suspect DE
shihou], yiding dou hui anpai yi-wei fanyiyuan zai ta pangbian zuo fanyi
time definitely all will arrange one-Cl translator at he beside do translation
'(At the time) when a prosecutor interrogates a foreign suspect, the court will definitely arrange a translator to do the translation beside him.'

(35) Universal NP inside VP of an *after*-clause

[$_{CP}$ [$_{IP}$ Haiguan [$_{VP}$ jiancha wan mei-wei lüke de xingli]] hou],
customs examine finish every-Cl passenger DE luggage after
ta jiu bixu jinsu likai jiancha qu, yimian fangai qita lüke
he then must quickly leave examination area in.order.not hinder other passengers
'After the customs unit finishes examining every passenger's luggage, he must leave the examination area quickly in order not to hinder other passengers.''

(36) Universal NP inside VP of a *as.long.as*-clause

[$_{CP}$ Zhiyao [$_{IP}$ ni [$_{VP}$ zixi guancha mei-wei chenggong de kexuejia]]],

as.long.as you carefully observe every-Cl successful DE scientists
ni hui faxian ta beihou yiding you yi-wei momo zhichi ta de qizi
you will find he back definitely have one-Cl silently support him DE wife
'As long as you carefully observe every successful scientist, you will find that his back definitely has a wife who silently supports him.'

(37) Universal NP inside VP of a *no.matter*-clause
[CP Buguan [IP ni zenme [VP hengliang [DP mei-ge ren de jiazhi]]]],
No.matter you how evaluate every-Cl person DE value
ta dou you cunzai de yiyi
he all have exist DE meaning
'No matter how you evaluate everyone's value, he has his own meaning of existence.'

(38) Universal NP inside VP of an *if*-clause
[CP [IP Ruguo ni [zixi guancha mei-ge ren]]], ni hui faxian
if you carefully observe every-Cl person you will find
ta shenshang yiding you ni zhide xuexi de difang
he body definitely have you worth learn DE places
'If you carefully observe everyone, you will find that there must be some places that you can learn from him.'

(39) Universal NP inside a preverbal PP of an embedded clause
a. [CP [IP Wo [VP [PP zai ti mei-wei fayinren] luyin] zhiqian]], wo dou
I Prog for every-Cl informant record before I all
hui xian yaoqiu ta qian tongyishu
will first request him sign authorization.agreement
'Before I recorded the speech of every informant, I will request him to sign an authorization agreement.'
b. [CP [IP Wo [AspP zai [VP [PP ti mei-wei bingren] kanbing shi]]]],
I Prog for every-Cl patient treat when
(wo) yiding hui wen qingchu ta you-mei-you qita bingshi
I definitely will ask clearly he have-not-have other history.of.illness
'When I see every patient, I will definitely ask if he has any history of other illness.'

We admit that speaker variations exist regarding the judgements of (33)-(39). A few native speakers we consulted do not accept the bound pronoun reading in (33)-(39),

but most of our 13 consultants accept such a reading. Despite lack of uniform agreement, we take it that an object universal Q-NP in a subordinate clause, be it an adverbial or relative clause, may bind a pronoun in the main clause without c-commanding it at surface structure. This leads us to explore another alternative to account for quantificational binding in Chinese. Before looking into such a possibility, we first show that quantificational binding is subject to a scope requirement.

5. Scope requirement on quantificational binding

As mentioned in section 1, Barker (2012) argued that most examples respecting the superficial c-command requirement for quantificational binding can be accounted for by the weaker scope requirement of quantifying expressions. In this section, we will investigate the interaction between scope and quantificational binding in Mandarin Chinese.

It is widely assumed that the scope of a quantifying expression is clause bounded. Thus, in (40) below, the embedded universal quantifier may not take scope over the matrix existential.

(40) Yesterday, [a guide]$_{\exists}$ ensured [$_{CP}$ that [every tour to the Louvre]$_{\forall}$ was fun]
(Fox and Sauerland 1996: 72)

The Chinese counterpart to (40) is similar. (41) does not have a reading according to which the tour guide varies with the tour to Louvre.

(41) Zuotian (you) yi-wei daoyou quebao-le mei-tang dao Louvre de lucheng
Yesterday have one-Cl guide ensure-Asp every-Cl to Louvre DE tour
dou shi youqu de
all be interesting Emp
'Yesterday, a guide ensured that every tour to Louvre was interesting.'

The narrow scope of the universal in (41) is predicted by the clause-boundedness constraint on quantifiers. But if the scope of a quantifier were always clause-bounded, that would mean that a universal NP embedded to a relative clause or any type of adverbial clause may not bind a pronoun outside the containing relative or adverbial clause regardless of the position of the universal NP in the clause. That in turn predicts that (16a)-(19a) and (33)-(39) should not have a bound pronoun reading, contrary to fact.

It should be emphasized that the universal NPs in those examples do have scope

outside their containing clause. Take (34) for example. In (34), the translator may vary with the suspect, though not necessarily, depending upon the nationality of the suspect. Likewise, in (33), the check that a given employee receives varies with the employee and the total number of checks sent by the boss equals to the number of the employees who receive the letters. In other words, *every employee* in the embedded clause of (33) must take scope over *a check* in the matrix clause. The covariation reading clearly shows that the universal NP in the subordinate clause has wide scope over the existential in the matrix clause that is not in the former's surface c-command domain.

It is worth noting that (33) has a past episodic interpretation and can be true in a situation where the boss sent every letter to his employees in one single event. This excludes the possibility that only generic tense gives rise to the wide scope interpretation of the universal NP.[7]

Clearly, universal quantifiers in Chinese are capable of escaping scope islands when they are embedded to an adjunct clause, though their scope is sometimes restricted to a local domain under certain conditions. Below we discuss some such conditions.

It has often been assumed that in Chinese when a quantifier or quantificational expression A c-commands another quantifier or quantificational expression B in surface syntax, A has scope over B. This has been stated as the following condition by Huang (1982: 220) (also see Aoun and Li (1989) and others for some variants of this condition.).

(42) The General Condition on Scope Interpretation
Suppose A and B are both QPs or both Q-NPs or Q-expressions, then if A-commands B at SS, A also c-commands B at LF.

The above scope condition predicts that (41) does not have a reading according to which the matrix existential varies with the universal in the embedded clause, because the existential c-commands the universal at surface structure. Very importantly, the General Condition on scope interpretation as given in (42) actually does not say that a quantificational expression A may not have scope over another quantificational

[7] Fox & Sauerland (1996) argue that universal quantifiers can bring about scope illusions in environment of generic tense, giving the impression that they escape scope islands, having a scope wider than their actual scope at LF. For example, though (i) is almost identical to (40) in the text except for its generic tense, the embedded universal quantifier seems capable of taking scope over the matrix existential, meaning that for every tour to Louvre, there is a guide who ensures that the tour is fun.

(i) In general, a guide ensures that every tour to the Louvre is fun.

expression B when B does not c-command A or may not have scope outside its containing clause when there is no B at all. Granted that this is correct, a universal quantifier should be able to have high scope unless it is blocked by another c-commanding quantifier.[8] If the above discussion is correct, then bound pronoun readings may be regarded as a pure phenomenon of scope requirement as Barker (2012) suggests. What matters is when a quantifier or quantificational expression may have scope outside its c-command domain and what governs this possibility.

6. Scope ambiguity and quantificational binding

In this section, we provide evidence involving quantifier scope to support the view that bound pronoun readings reflect an LF scope requirement rather than a syntactic c-command requirement at surface structure.

Huang (1982) discussed some NP constructions in which a quantificational expression properly contains another possessive Q-NP with a quantifier of its own, as illustrated below.

(43) Wo mai-le [$_{\text{Q-NP1}}$ [$_{\text{Q-NP2}}$ san-ge ren de] [$_{\text{Q-NP3}}$ mei-ben shu]]
I buy-Asp three-Cl person DE every-Cl book
'For three men x, I bought every one of x's book'

(44) Wo mai-le [$_{\text{Q-NP1}}$ [$_{\text{Q-NP2}}$ mei-ge ren de] [$_{\text{Q-NP3}}$ san-ben shu]]
I buy-Asp every-Cl person DE three-Cl book
'For every man x, I bought three of x's books.'

In both (43) and (44), the two quantificational expressions, Q-NP$_1$ and Q-NP$_2$ are not in a relationship of c-command but a relationship of containment. Yet, they exhibit a relationship of relative scope. The less inclusive possessive Q-NP$_2$ is understood to have wider scope than the more inclusive Q-NP$_1$ containing the possessive *de*-Q-NP. And that is the only scope interpretation available.

Significantly, when a preceding Q-NP, instead of being a possessive, is contained within a relative clause modifying another Q-NP, the sentence is ambiguous between an external and internal reading on the Q-NP inside the relative clause. This can be illustrated by Huang's (1982: 213) example below:

(45) [$_{\text{DP}}$ [$_{\text{CP}}$ Ta piping meige ren] de mei-pian wenzhang] dou hen youqu
he criticize every man DE every-Cl article all very interesting

[8] Crossover situations will be discussed later.

a. ‘For every man x, every article in which he criticized x is very interesting.’
b. ‘Every article in which he criticized everybody is very interesting.’

In (45), the relative clause precedes the modified noun phase *meipian wenzhang* ‘every article’ and the Q-NP ‘every man’ inside the relative clause has both an external and internal reading with respect to the bracketed complex NP.

Note that in Chinese, the determiner that modifies the head noun may also appear before the relative clause (cf. Chao 1968, Lin 2003/2004, among others). When this is the configuration as in (46), the sentence becomes unambiguous, with the Q-NP inside the relative clause having only internal scope, i.e., scope inside the relative clause (See Huang 1982: 213).

(46) [DP Mei-pian [CP ta piping mei-ge ren de] wenzhang] dou hen youqu
every-Cl he criticize every-Cl person DE article all very interesting
‘Every article in which he criticized every man is very interesting.’

Huang (1982) argues that the non-ambiguity of (43), (44) and (46), as well as the ambiguity of (45), follows from the General Condition on Scope Interpretation stated in (42).

In (43) and (44), the less inclusive possessive Q-NP c-commands the Q-NP to its right. So the latter can only have scope narrower than the former. Likewise, in (46), when the Q-determiner *meipian* ‘every’ that modifies *wenzhang* ‘article’ is placed before the relative clause, it c-commands the Q-NP *meige ren* ‘everyone’ embedded to the relative clause. So *meige ren* ‘everyone’ can only have narrow scope relative to *meipian wenzhang* ‘every article’. In contrast, the Q-NP *meige ren* ‘everyone’ in (45) is not c-commanded by the Q-determiner *meipian* ‘every’, which follows the former; so it can have either wide or narrow scope.

With Huang’s above discussion as background, now consider (47).

(47) [DP [CP Ni piping mei-wei zhengke de] mei-pian wenzhang] bujin
you criticize every-Cl politician DE every-Cl article not.only
mei dadao mudi, faner shi rang ta/tamen gengwei bianbenjiali
not achieve goal but be make him/them more aggravate
a. For every politician x, every article in which you criticize x not only did not achieve its goal but make **him** get even worse.
b. Every article in which he criticized every politician not only did not achieve its goal but make **them** get even worse.

(47) is a construction akin to Huang's (45) but the matrix VP is now a conjoined VP containing a pronoun. As (45) has two readings, (47) is ambiguous for 'every politician' between the external and the internal reading. However, only the external reading licenses the bound pronoun reading. When *every politician* is understood as having internal scope, only the plural pronoun *tamen* is legitimate but not the singular pronoun *ta*.

When the Q-determiner *meipian* in (47) is placed before the relative clause, hence c-commanding the Q-NP *meiwei zhengke* 'every politician' in the relative clause, only the plural pronoun is allowed to refer back to *every politician*, as is shown by (48).

(48) [$_{DP}$ Mei-pian [$_{CP}$ ni piping mei-wei zhengke de] wenzhang] bujin
every-Cl you criticize every-Cl politician DE article not.only
mei dadao mudi faner shi rang *ta/tamen genwei bianbenjiali
not achieve goal but BE make him/them more aggravate
a. *For every politician x, every article in which you criticize x not only did not achieve its goal but make **him** get even worse.
b. Every article in which you criticized every politician not only did not achieve its goal but make **them** get even worse.

The contrast between (47) and (48) clearly shows that the possibility of the bound pronoun reading is a result of the scope of the Q-NP inside the relative clause. When it has external scope, the bound pronoun reading is permitted; when it has internal scope, the bound pronoun reading is not allowed.

The following examples point to the same direction. When a universal NP is embedded to a negated *if*-clause with a modal, the universal NP may have scope over the *if*-clause, hence over the negated modal, i.e., the external reading, or have the narrowest scope, i.e., the internal reading, as is shown by (49).[9] Again, the external reading licenses the bound pronoun reading, but the internal one does not. This lends further support to the view that the scope requirement at LF rather than the c-command requirement in surface syntax is the key factor responsible for the bound pronoun reading.

[9] A reviewer wonders whether the scope interpretation in (49b) violates the General Condition on Scope Interpretation stated in (42). The answer is negative if the "Q-expressions" in (42) are understood as quantificational determiners/numerals in noun phrases.

(49) a.Ruguo bu keneng gei mei-ge xiaohai yi-fen da jiangpin, shi bu shi keyi
if not possible to every-Cl child one-Cl big prize be not be possible
gei *ta/tamen yi-fen xiao liwu
give him/them one small-Cl gift (scope: if> not > possible > every)
'If it is not possible to give every child a big prize, is it possible to give *him/them a small gift?'

b. Ruguo bu keneng gei mei-ge xiaohai yi-fen da jiangpin, shi bu hi keyi
if not possible to every-Cl child one-Cl big prize be not be possible
gei ta/tamen yi-fen xiao liwu[10]
give him/them one-Cl small gift (scope: every > if > not > possible)
'For every child x, if it's not possible to give x a big prize, is it possible to give him a small gift?'

7. Weak crossover and the c-command requirement

In the previous sections, we saw that Q-NPs such as *mei-ge*-N 'every N' may take high scope even out of a relative or adverbial clause. We also saw that the interaction between quantificational expressions is subject to the General Condition on Scope Interpretation. As has been widely discussed in the literature, this condition explains why (50) is not ambiguous with the only reading that the existential scopes over the universal.

(50) (You) yi-ge nanren aishang mei-ge nüren
have one-Cl man love every-Cl woman

[10] A reviewer pointed out that if the scope interpretation in (49) is allowed, isn't it the case that the following unembedded sentence should have a similar interpretation?

(i) Ta bu keneng kandao mei-ge ren
he not possible see every-Cl person
'He is not likely to have seen everyone.'

We agree that it is difficult for the universal NP in (i) to have scope over negation and the modal, but it is relatively easy for the universal NPs in (ii) and (iii) to have high scope.

(ii) Jin nian bu keneng gei mei-ge ren yi-fen da jiangpin le, zhi neng fa ge xiao liwu
this year not possible give every-Cl person one-Cl big prize Asp only can give Cl small gift
'This year, we are not able to give everyone a big prize. We can only afford a small gift.'

(iii) Jin nian wo kending shi bu neng gen mei-wei lao you jianmian le,
this year I definitely be not possible with every-Cl old friend meet Asp
yinwei wo bu hui chuxi huiyi
because I not will attend meeting
'This year I definitely will not be able to meet with every old friend, because I will not attend the meeting.'

We will not discuss the above contrast in this article.

'A man loves every woman.'

When the existential in (50) is replaced with a pronoun as in such examples as (51b), the pronoun may not be construed as being bound by the universal, parallel to its English counterpart (51a).

(51) a. *He$_i$ loves everyone$_i$.
b. *Ta$_i$ aishang mei-ge ren
he love every-Cl person
'*He$_i$ loves everyone$_i$'

Examples such as (51a,b) are known as cases of strong crossover because the subject pronoun c-commands the universal. When the pronoun is further embedded as in (52), the bound pronoun reading is still not possible, though the pronoun no longer c-commands the universal. Again, this applies to both English and Chinese and such a configuration is referred to as the weak crossover configuration.

(52) a. *His$_i$ mother loves everyone$_i$.
b. *Ta$_i$ de mama ai meigeren$_i$
he DE mother love everyone
'*His$_i$ mother loves everyone$_i$.'

Chomsky (1976) invoked the Leftness Condition (LC) to account for the impossibility of variable binding under weak crossover.

(53) Leftness Condition (Chomsky 1976: 342)
A variable cannot be the antecedent of a pronoun to its left.

According to Leftness Condition, both (51) and (52) are ruled out because after the Q-NP has undergone quantifier raising at LF, the pronoun is co-indexed with a variable, i.e., the trace of the Q-NP, to its right.

Some linguists such as Higginbotham (1980b) and Bianchi (2001), however, argued that reference to linear order is not necessary and propose a pure configurational account for crossover situations. Take Bianchi (2001) for example. She proposed to employ the notion of asymmetric c-command to account for crossover examples. Briefly, her idea is that "neither the bound pronoun nor any category containing it can asymmetrically c-command the variable" that it depends on. According to her, a bound pronoun inherits the value of the real variable left by

the Q-NP via QR. Denotationally, the bound pronoun is said to *directly* depend on the variable to which the pronoun is linked. Since the value of the pronoun is not fixed, the denotation of a larger constituent containing the pronoun also varies with the denotation of the pronoun. The larger constituent is said to *indirectly* depend on the variable for its denotation. With these assumptions, Bianchi restated Leftness Condition as something like the following Anti-c-command Condition at LF:

(54) Anti-c-command Condition (Bianchi 2001: 10)
If a constituent X asymmetrically c-commands a constituent Y, then X does not (directly or indirectly) depend on Y.

Though (54) is not Bianchi's final version of Anti-c-command Condition, this version of the pure configurational account for the Leftness Condition is sufficient for the purpose of this article.

Returning to (51) and (52), the subject pronoun in (51b) and the possessor pronoun in (52b) are not quantificational expressions. So *meige ren* 'everyone' in these examples are not c-commanded by any quantifier or Q-NP. According to the General Condition on Scope Interpretation in (42) and our above discussion, *meige ren* 'everyone' in (51b) and (52b) should in principle be able to take sentential scope and bind the pronoun, which is contrary to fact. Barker (2012) says (for English) that such crossover situations are the only cases that he is aware of in which the scope requirement alone is not able to explain why quantificational binding fails, but a c-command requirement correctly predicts the failure of quantificational binding. It is therefore worth investigating crossover situations more deeply.

Note that crossover situations are not restricted to sentences such as (51) and (52). A pronoun can also be embedded to a relative or adverbial clause which in turn precedes a quantificational expression. For example, in (55) and (56), the pronoun is inside a relative clause and precedes the universal which is part of the matrix VP. The pronoun in this configuration can by no means obtain the bound pronoun reading, be it in the subject position such as (55) or object position such as (56).

(55) *[$_{DP}$ [$_{CP}$ Ta$_i$ shoudao de] xin shangmian] dou you mei-ge ren$_i$ de taitai de
he received DE letter top all have every-Cl person DE wife DE
mingzi[11]
name

[11] (55) is adapted from Huang (1982) by reversing the position of the pronoun and the universal. If the universal is in the relative clause and the pronoun in the matrix VP, the bound pronoun reading is permitted.

‘*The letters that he$_i$ received have everyone$_i$’s wife’s name on it.’

(56) *Laoban ji gei ta de qinbixin dou fushang-le yi-zhang jiangli
boss send to him DE personal.letter all attach-Asp one-Cl reward
mei-wei yuangong de zhipiao
every-Cl employee DE cheque
‘*The personal letters that the boss sent to him$_i$ contain a cheque to reward everyone$_i$.’

When a pronoun is embedded to the subject position of an adverbial clause, binding of the pronoun also seems to be unacceptable or difficult to get. For example, in (57)-(59), the subject pronoun of an adverbial clause is co-indexed with a Q-NP subject of the main clause and this is not acceptable, respecting Leftness Condition.

(57) *Ruguo ta$_i$ haohao xuexi, mei-ge haizi$_i$ dou keyi fahui zui da de qianneng
if he properly learn every-Cl child all can show most big DE potential
‘For every child x, if x properly learns, x can show the biggest potential.’

(58) *Ta$_i$ fayan zhiqian, mei-wei tingzhong$_i$ dou bixu xian ju shou
he speak before every-Cl audience all must first raise hand
‘For every audience x, before x speaks, x must raise his hand.’

(59) *Ta$_i$ jinru haiguan de-shihou, mei-wei$_i$ lüke dou bixu jieshou shaomiao
he enter customs when every-Cl passenger all must receive scanning
jiancha
examination
‘For every passenger x, when x enters the custom, x must receive the examination of scanning.’

Significantly, however, when a pronoun is embedded to an object position in an adverbial clause, more than half of our fifteen consultants (11, 9 or 8 people) accept the bound pronoun reading of this configuration relatively easily, surprisingly not in consonance with the Leftness Condition. This is in contrast to (56) we discussed above, where an object pronoun appears in a relative clause and is correctly predicted to be ill-formed by Leftness Condition. Compare (60)-(62) with (57)-(59).

(60) Ruguo ni haohao yindao ta, mei-ge haizi yiding dou keyi fahui zui da
if you properly lead him every-Cl child definitely all can show most big

de qianneng
DE potential
'For every child x, if you lead x properly, x definitely can show the biggest potential.'

(61) Zhiyao ni ken yong xin jiao ta, (wo xiangxin) mei-wei xuesheng dou
As.long.as you willing with heart teach him I believe every-Cl student all
hui ganji ni
will appreciate you
'For every student x, as long as you are willing to teach x with heart, (I believe that) x will appreciate you (for your kindness).'

(62) Zai shangji zudang ta de fayan zhiqian, mei-ge ren dou keyi ziyou fabiao
at superior block he DE speech before every-Cl person all can freely make
yanlun
speech
'For everyone x, before the superior blocks x from speaking, x has the freedom to make speeches.'

So, there seems to be a subject/object asymmetry with respect to backward quantificational binding of a pronoun in an adverbial clause. [12]

The asymmetry in question seems very similar to the subject/object asymmetry for pronominal anaphora in Chinese we discussed in section 3. There we saw that a pronoun in the subject position of an adverbial clause may not be co-referential with a proper name or definite description in the main clause, but an object pronoun may. The contrast between (57)-(59) and (60)-(62) reflects a similar pattern. The similarity is not identical, however. Recall that as we saw in (56), a pronoun in a relative clause may not be backward-bound by a universal NP following it even when the pronoun occupies an object position. When the universal NP is replaced by a proper name, however, co-reference is permitted. Compare (63) with (56).

[12] An anonymous reviewer pointed out that he does not find a contrast between (ia) and (ib), contrary to our discussion of the contrast between (56) and (60)-(62). Though the anonymous reviewer is aware of speaker variations, he says that (ia) and (ib) might both be bad or good for him. Although the judgement is subject to the speaker variation, (ia) sounds to us better than (ib).

(i) a. Ruguo ni gei ta_i hao chengji, mei-ge $xuesheng_i$ dou hui hen gaoxing
if you give him good grades every-Cl student all will very happy
'If you give him_i good grades, every $student_i$ will be happy.'
b. Ni gei ta_i de hao chengji rang mei-ge $xuesheng_i$ dou hen gaoxing
you give him DE good grade let every-Cl student all very happy
'The good grade that you gave him_i made every $student_i$ happy.'

(63) Laoban ji gei ta de qinbixin limian hai fushang-le yi-zhang jiangli
boss send to him DE personal.letter inside also attach-Asp one-Cl reward
Zhangsan de zhipiao
Zhangsan DE cheque
'The letter that the boss sent to him$_i$ contains a check to reward Zhangsan$_i$.'

We conclude that there is a contrast between object pronouns in relative clauses and those in adverbial clauses with respect to backward quantificational binding. This certainly calls for an explanation, as one construction respects Leftness Condition, whereas the other one does not.

Another interesting observation to note is that in (57) through (62), the Q-NPs occupy the subject position of the main clause. When the Q-NPs appear in an object position or belong to part of the VP in the main clause as in (64)-(66), the percentage of people who accept the bound pronoun construal decreases. Our investigation shows that at most around 30 percent of our 16 informants accept the bound pronoun construal for such constructions, depending upon individual sentences. Again, though this is not a unanimous agreement among the native speakers we consulted, the contrast seems clear and real for many people.

(64) #Ruguo ni haohao jiao ta$_i$, ni yiding neng tisheng meige xuesheng$_i$ de
if you well teach him you definitely can improve every student De
chengji
grade
'If you guide him well, you will definitely improve every student's grade.'

(65) #Zai shangji yunxu ta fayan yiqian, wo bu zhun meige ren fabiao yijian
at superior allow him speak before I not allow every person express opinion
'Before the superior allows him to speak, I do not allow everyone to express his opinion.'

(66) #Wo jiandao ta de-shihou, wo dou (hui) gen mei-ge ren da ge zhaohu
I see him when I all will to every-Cl person do Cl greeting
'When I see/saw him, I will/would greet to everyone.'

To sum up, the weak crossover patterns of quantificational binding in Chinese can be summarized as follows.

(67)

main clause / subordinate clause	subject Q-NP	object Q-NP
I. relative clause subject pronoun	NA[13]	X
II. relative clause object pronoun	NA	X
III. adverbial clause subject pronoun	X	X
IV. adverbial clause object pronoun	√	X

Recall that Q-NPs in Chinese may in principle take wide scope unless there is some rule which otherwise prevents them from doing so, such as the General Condition on Scope Interpretation in (42). We would like to propose that in addition to this condition, quantificational binding is subject to the same non-coreference rule in (32) as coreferential pronouns do. That is, this rule applies not only to the relation between a pronoun and an R-expression but also to the relation between a pronoun and a Q-NP as well. This assumption seems entirely justified in view of the general view that environments in which quantificational binding is possible are a proper subset of the environments in which definite pronominal co-reference is allowed. (See Higginbotham (1980a, 1980b) for an explicit statement to this effect.) Recall that our non-coreference rule is formulated as the Chinese version of Principle C of the theory of A-Binding. It is then entirely natural that in Chinese, a pronoun under consideration for quantificational binding must also first obey this non-coreference rule. (A quantificational NP is an R-expression in the sense of Binding Theory, including rule (32).) Given this extension, (67-I) and (67-III) simply fall under this rule: in each case a pronoun phase-c-commands its intended antecedent and coindexing is ruled out by (32). What remains to be explained is the contrast between pattern (67-II) and pattern (67-IV).

It is important to emphasize that quantificational binding is an LF phenomenon. This must be so because for a Q-NP inside a subordinate clause to bind a pronoun not in its surface c-command domain, the Q-NP must occupy a position different from its surface position at LF in order to obtain the right scope configuration. It is also well-

[13] In order for a pronoun inside a relative clause to precede a Q-NP in the main clause, the relative clause must modify a subject NP. Consequently, the Q-NP may not occupy the subject position of the main clause.

accepted that at LF some phrases need to reconstruct in order to obtain a certain reading. For example, *someone* in the English sentence *someone is likely to lose* is ambiguous between the wide and narrow scope reading with respect to the modality word *likely*. When *someone* takes narrow scope, it is often assumed that it reconstructs back to the lower subject position. This reconstruction idea inspires us to think that perhaps the pattern in (67IV) can be accounted for by reconstruction.

Adverbial clauses in Chinese often have two surface positions, either before the subject or after the subject. For example, all the adverbial clauses in (60)-(62) can be placed after the subject position, too, as shown below.

(68) [Mei-ge haizi] [ruguo ni haohao yindao ta] yiding dou keyi fahui zui da
every-Cl child if you properly lead him definitely all can exert most big
de qianneng
DE potential
'For every child x, if you lead x properly, x definitely can unleash x's biggest potentials.'

(69) [Mei-wei xuesheng] [zhiyao ni ken yong xin jiao ta, (wo xiangxin)
every-Cl student as.long.as you willing use heart teach him I believe
dou hui ganji ni
all will appreciate you
'For every student x, as long as you are willing to teach x with heart, (I believe that) x will feel grateful to you.'

(70) [Mei-ge ren] [zai shangji zudang ta de fayan zhiqian] dou keyi ziyou fabiao
every-Cl person at superior block he DE speech before all can freely make
yanlun
speech
'For everyone x, before the superior blocks x from speaking, x has the freedom to make speeches.'

In (68)-(70), since the Q-NPs are in subject position, they c-command constituents following them, including the adverbial clauses.[14] Therefore, those Q-NPs can bind the pronouns contained in the adverbial clauses.

Now let us assume that the adverbial clauses in (60)-(62) are preposed clauses

[14] A reviewer says that the QPs in (68)-(70) can also be analyzed as topics and the adverbial clauses are base-generated. This is indeed possible, but the point is that the phrase structure rules in Mandarin Chinese also allow the QPs in (68)-(70) to be generated at the subject position followed by an adverbial clause adjoined to some projection of VP or higher than VP.

and can be reconstructed back to the position after the subject NP at LF. Then, at LF, the structures of (60)-(62) should look the same as the structure in (68)-(70), where the pronoun is not to the left of the variable after quantifier raising of the Q-NP but to its right. Therefore, there is no violation of the Leftness Condition or Bianchi's configurational anti-c-command condition.

The proposed reconstruction account is also compatible with the fact that when the Q-NP is an object in the main clause, that Q-NP may not bind an object pronoun in an adverbial clause as in examples (64)-(66). This is the case because even if reconstruction occurred in these constructions, the pronoun would still be to the left of the variable left by QR-ing the Q-NP in violation of the Leftness Condition or the Anti-c-command condition. We therefore correctly predict that the pattern (67-IV) is not acceptable.

A clarification about the reconstruction account is now in order. If the reconstruction account is to succeed, the non-coreference rule must apply to surface structure representations (or S-Structure) in contrast to the Leftness Condition or the Anti-c-command Condition, which applies to LF representations. As noted, a pronoun embedded in a subordinate subject position cannot be co-referential with a proper name in the main clause. Therefore, (71) is ungrammatical.

(71) *Dang ta jinlai de-shihou, Zhangsan haoxiang hen lei de-yangzi
When he enter when Zhangsan seem very tired as.if
'When he entered, Zhangsan seemed to be very tired.'

If we are to reconstruct the adverbial clause and put it below the subject, coreference becomes acceptable:

(72) Zhangsan, dang ta jinlai de-shihou, haoxiang hen lei de-yangzi
Zhangsan when he enter de-time seem very tired as.if
'Zhangsan seemed to be very tired when he entered.'

The contrast between (71) and (72) illustrates what has been known in the literature as the anti-reconstruction effects on adjuncts, famously represented by examples like (73):

(73) Which picture that $John_i$ took does he_i like t?

(73) shows an anti-reconstruction effect in the sense that reconstruction would wrongly render co-reference impossible, as predicted by Principle C. The contrast

between (71) and (72) also shows an anti-reconstruction effect because reconstruction of (71) would render it well-formed with coindexing, contrary to fact. The classical solution in GB (Chomsky 1981) was that Principle C applies to S-Structure, after overt movement but before LF. This view does not preclude reconstruction of an adjunct, but simply predicts that reconstruction will have no effects on co-reference possibilities governed by Binding Principle C.

Another well-known proposed solution, due to Lebeaux (1988, 2009) and inherited by others, is the idea that adjuncts are 'late-merged' -- they are merged in their surface position, never originating from a lower position, from which they would or might violate the relevant conditions. This view assumes that there is no reconstruction for adjuncts in LF.

Note that our account of Pattern (67-IV) crucially assumes that adverbial adjuncts can be reconstructed. When an adverbial clause contains an object pronoun is reconstructed below the main clause subject, a subject Q-NP is able to bind the pronoun (obeying the Leftness Condition), but an object Q-NP cannot (still violating the Leftness Condition). Furthermore, our account of the distinction between Patterns (67-III) and (67-IV) crucially assumes that Rule (32)—the Chinese Principle C'—applies at S-Structure, and that the ill-formed configurations of Pattern (67-III) cannot be saved by reconstruction. In short, under our assumptions, adjuncts can be reconstructed, but while they do not have effects on principles applied earlier (e.g., after overt movement), they do have effects applied in LF (e.g., the Leftness Condition or Bianchi's Anti-c-command formulation of it). The Pattern (67-III) is dead by Rule (32) and has no chance to become good in LF. The Pattern (67-IV) does not violate (32) and can be reconstructed to a form that meets the LC at LF.

Finally, let us consider the case of relative clauses. As mentioned, pattern (67-I) is explained by the non-coreference rule (32) blocking a subject pronoun in a subordinate clause from being linked to an R-expression in the main clause. However, the non-coreference rule does not apply to pattern (67-II), which involves an object pronoun within a subordinate VP. Note that reconstruction does not rescue Pattern (67-II) because there is no possibility of reconstructing the relative clause. So Pattern (67-II) must involve a configuration where a pronoun is to the left of a Q-NP in violation of Chomsky's Leftness Condition or Bianchi's Anti-c-command Condition.

To sum up this section, whether or not backward quantificational binding in Chinese is legitimate involve several mechanisms or conditions in the theory of Chinese grammar, which are: (i) the language-specific non-coreference rule, (ii) reconstruction possibility, and (iii) Chomsky's LC or Bianchi's reformulation of it as a pure configurational Anti-c-command Condition. All these mechanisms are

independently needed and the distribution of backward quantificational binding is a consequence of the interaction between them.

8. *Dou* and the Scope of Universal NPs

It is often pointed out by Chinese linguists that universal Q-NPs are usually accompanied by the word *dou* 'all', as is shown below.

(72) Mei-ge ren dou likai-le
every-Cl person all leave-Asp
'Everyone left.'

As far as we know, linguists haven't come to a consensus as to the semantic function of *dou* (See Lin (1998), Huang (2005), Luo (2011), Giannakidou and Cheng (2006) for example). So in this article, we will not try to settle the semantic contribution of *dou*. What is crucial to our concern here is another observation made in Huang (1982) and later discussed by Jin (1998). Huang pointed out that the position of *dou* may influence the possibility of licit quantificational binding. He observed that for a Q-NP in a relative clause to bind a pronoun in the main clause, *dou* must be placed in the main clause rather than in the relative clause, as is shown by the following contrast between (73a)-(73b).

(73) a. [Mei-ge ren$_i$ shoudao de xin] shangmian **dou** you ta$_i$ taitai de mingzi
every-Cl person receive DE letter top all have he wife DE name
'For every person x, letters that x received have x's wife's name on them.'
b. *[Mei-ge ren$_i$ **dou** shoudao de xin] shangmian you ta$_i$ taitai de mingzi
every-Cl person all receive DE letter top have he wife DE name
'Letters that everybody$_i$ received have his$_i$ wife's name on them.'

The following example from Jin (1998:58) illustrates the same point.

(74) a. Mei-ge kaosheng$_i$ jin kaochang zhiqian, ta$_i$ **dou**
every-Cl candidate.student enter examination.room before he all
bixu daishang zhunkaozheng
must wear permission.ID
'Before every candidate student$_i$ enter the examination room, he$_i$ must wear the permission ID.'

b. *Mei-ge kaoshengi **dou** jin kaochang zhiqian, tai
every-Cl candidate.student all enter examination.room before he
bixu daishang zhunkaozheng
must wear permission.ID
'Before every candidate studenti enter the examination room, hei must wear the permission ID.'

According to Huang, *dou* is a scope adverb and it indicates the scope of the universal Q-NP. So, in (73a), where *dou* is in the matrix clause, the universal Q-NP may have matrix scope and bind the pronoun. In contrast, in (73b), *dou* is in the relative clause, so the universal Q-NP must have scope internal to the relative clause, where it fails to c-command the pronoun. This account further supports our position that quantificational binding in Mandarin Chinese has to do with scope of quantifiers at LF rather than their surface positions.

9. Conclusions, implications and residues problems

This article discussed quantificational binding without c-command in Mandarin Chinese. We argued that quantificational binding is an LF phenomenon constrained by LF mechanisms. A minimum requirement for quantificational binding is that the pronoun bound by a given quantifier must be within the scope of that quantifier at LF. In principle, Q-NPs can have high scope, scoping even out of their containing clause. That is why they may bind a pronoun in the main clause even when they are embedded to a subordinate clause such as a relative or adverbial clause.

The phenomenon of quantificational binding without c-command in Chinese implies that the traditional assumption of the clause boundedness constraint on Q-NPs is empirically inadequate. Under this assumption, many examples of quantificational binding without surface c-command discussed in this article would be wrongly ruled out by that constraint. However, scope taking of Q-NPs is not without constraints. It is subject to conditions such as the general Condition on Scope Interpretation, which prevents a Q-NP from taking scope over another quantifier or Q-NP that c-commands it at surface structure.

Backward quantificational binding, on the other hand, is a result of the interaction of several independently motivated mechanisms, including the possibility of reconstruction at LF, the Chinese specific non-coreference rule (Principle C' applied following overt movement), and Chomsky's Leftness Condition or Bianchi's reformulation of it as a pure configurational Anti-c-command Condition (applied at LF). If our analysis is on the right track, another implication is that adjunct

reconstruction must be allowed, so as to rescue some Leftness Condition constructions at LF and that the so-called anti-reconstruction effect with respect to Binding Principle C can be accounted for by having the principle apply to the output of overt movement. It will be worthwhile to see how our facts and analysis can be reconciled with the current works exploring the consequences of the Late Merge hypothesis.

Since our account of quantificational binding without c-command involves only rules or assumptions that are needed elsewhere, to the extent that it is successful, this is a much welcome result. However, there is still one curious thing that needs to be explained. Recall that our attempt to find a new alternative explanation of quantificational binding in Chinese is based on the refutation of Jin's (1998) observation that an embedded Q-NP in the object position of a subordinate clause may not bind a pronoun in the main clause. A question then arises. What happens to Jin's original unacceptable examples? Why are they bad? One possibility is that Jin's examples are due to idiolect variation. As noted in the text, our own investigation of quantificational binding shows that there is no absolute, uniform agreement on the judgements of the bound pronoun reading in many examples. So Jin's judgements may be just one example of such variation. This speculation, however, may be refuted by the fact, pointed out to us by a reviewer, that if Jin's examples are slightly modified by adding some "additional" expressions and phrases as most of the authors' examples in this article do, the judgments vary. Choosing the right words thus seems to be crucial in addition to the structural factors. But what is exactly the nature of the "additional" expressions and what counts as such expressions are unclear to us.

With regard to the judgment variations, another reviewer raises a similar question for Principle C', applying at S-structure. As discussed, according to our Principle C', a subject pronoun in an adverbial clause is not allowed to be co-referential with a proper name in the main clause. So, (75) is unacceptable.

(75) *Buguan ta$_i$ xi-bu-xihuan, Zhangsani dou dei lai
regardless he like-not-like Zhangsan all must come
'Regardless of whether he$_i$ likes it or not, Zhangsan$_i$ has to come.'
(Huang 1998: 275)

However, the reviewer pointed to us that (76) seems to be acceptable to him.

(76) Suiran/yaoshi/jishi ta$_i$ yizai shibai, (wo zhidao) Zhangsan$_i$ hai shi
athough/if/even.if he repeatedlu fail I know Zhangsan still be
hui yizhi nuli xiang qian de

will always strive toward front DE
'Although/(even) if he$_i$ failed/fails repeated, (I know that) Zhangsan$_i$ will keep striving forward.'

Note that (75) and (76) are of the same syntactic form with a pronoun embedded to the subject position of an adverbial clause. Yet, pronominal anaphora in (76) is more acceptable than that in (75). The contrast in question is similar to the quantificational binding contrast between Jin's (1998) examples and our examples discussed above. The question is why such contrasts exist. Again, this is a difficult question that we are not able to answer at this time and must leave it as a residual problem for future research. It is hoped, however, that the research results of this article represent a positive step toward our understanding of quantificational binding and pronominal anaphora in natural language, especially in Mandarin Chinese.

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References

Aoun Joseph, and Yen-hui Audrey Li. 1989. Scope and constituency. *Linguistic Inquiry,* 20(2): 141-172.

Aoun, Joseph, and Yen-hui Audrey Li. 1990. Minimal disjointness. *Linguistics,* 28(2): 189-203.

Barker, Chris. 2005. Remark on Jacobson 1999: Crossover as a local constraint. *Linguistics and Philosophy,* 28(4): 447-472.

Barker, Chris. 2009. Reconstruction as delayed evaluation. In *Theory and evidence in semantics*, ed. by Erhard Hinrichs and John Nerbonne, 1–28. Stanford, CA: CSLI

Publications.
Barker, Chris. 2012. Quantificational binding does not require c-Command. *Linguistic Inquiry,* 43(4): 614-633.
Bianchi, Valentina. 2001. Antisymmetry and the leftness condition: leftness as anti-c-command. *Studia Linguistica,* 55(1): 1-38.
Bresnan, Joan. 1994. Linear order vs. syntactic rank: Evidence from weak crossover. In CLS 30: Papers from *the 30th Regional Meeting of the Chicago Linguistic Society. Vol. 1, The main session,* ed. by Katharine Beals, Jeannette Denton, Bob Knippen, Lynette Melnar, Hisami Suzuki, and Erika Zeinfeld, 57–89. Chicago: University of Chicago, Chicago Linguistic Society.
Bresnan, Joan. 1998. Morphology competes with syntax: Explaining typological variation in weak crossover effects. In *Is the best good enough? Optimality and competition in syntax,* ed. by Pilar Barbosa, Danny Fox, Paul Hagstrom, Martha McGinnis, and David Pesetsky, 59-92. Cambridge, MA: The MIT Press and MIT Working Papers in Linguistics.
Bruening, Benjamin. 2014. Precede-and-command revisited. *Language,* 90(2):342-388.
Chao, Yuen Ren. 1968. *A Grammar of spoken Chinese*. Berkeley and Los Angeles: University of California Press.
Chomsky, Noam. 1976. Conditions on rules of grammar. *Linguistic Analysis,* 2: 303-351.
Chomsky, Noam. 1981. *Lectures on government and binding*. Dordrecht: Foris.
Evans, Gareth. 1977. Pronouns, quantifiers, and relative clauses (I). *Canadian Journal of Philosophy,* 7(3):467-536.
Evans, Gareth. 1980. Pronouns. *Linguistic Inquiry,* 11(2):337-362.
Fox, Danny, and Uli Sauerland. 1996. Illusive scope of universal quantifiers. *NELS 26*, ed. by Kiyomi Kusumoto, 71–86. Amherst, MA: GLSA.
Giannakidou, Anastasia, and Lisa Lai-Shen Cheng .2006. (In)definiteness, polarity, and the role of wh-morphology in free choice. *Journal of Semantics,* 23(2): 135-183.
Harley, Heidi. 2002. Possession and the double object construction. In *Linguistic variation yearbook* 2, ed. by Pierre Pica, and Johan Rooryck, 31-70. Amsterdam: John Benjamins.
Higginbotham, James. 1980a. Pronouns and bound variables. *Linguistic Inquiry,* 11(4): 679-708
Higginbotham, James. 1980b. Anaphora and GB: some preliminary remarks. In *Proceedings of NELS* 9, ed. by J. Jensen, 223-236. Ottawa: University of Ottawa.
Higginbotham, James. 1983. Logical form, binding, and nominal. *Linguistic Inquiry,*

14(3): 395-420.
Huang, C.-T. James. 1982. *Logical relations in Chinese and the theory of grammar*. PhD dissertation, MIT.
Huang, C.-T. James. 1983. On the representation of scope in Chinese. *Journal of Chinese Linguistics,* 11(1):36-91.
Huang, C.-T. James. 1994. Logical Form. In *Government and Binding Theory and the Minimalist Program,* ed. by G. Webelhuth, 127-175. Oxford: Blackwell.
Huang, C.-T. James. 1998. *Logical relations in Chinese and the theory of grammar*. New York & London: Garland Publishing, Inc.
Huang, C.-T. James. 2010. *Between syntax and semantics*. New York: Routledge.
Huang, C.-T. James ,and Jo-Wang Lin. 2016. Quantificational binding in Mandarin Chinese. Paper presented at IACL24, Beijing Language University, July 17-19, Beijing, China.
Huang, Shi-Zhe. 2005. *Universal quantification with skolemization as evidenced in Chinese and English*. Lewiston, New York: The Edwin Mellen Press, Ltd.
Jin, Hui-hui. 1998. A study of Chinese bound pronouns. Unpublished master thesis. National Chung cheng University, Taiwan.
Lebeaux, David. 1988. *Language Acquisition and the Form of the Grammar.* PhD dissertation, University of Massachusetts at Amherst.
Lebeaux, David. 2009. *Where does the Binding Theory Apply?* Cambridge, MA: The MIT Press.
Lin, Jo-Wang.1998. Distributivity in Chinese and its implications. *Natural Language Semantics,* 6(2): 201-243.
Lin, Jo-Wang.2003/2004. On Restrictive and Non-restrictive Relative Clauses in Mandarin Chinese. *Tsing hua Journal of Chinese Studies,* 33(1): 199-240. Actual publication date is April, 2004.
Lin, Jo-Wang, and C.-T. James Huang. 2015. Quantificational binding in Chinese. Paper presented at the Theoretical Linguistics Conference: 30 Years of Linguistics at Tsing Hua, September 4, Tsing Hua University, Taiwan.
Lin, Jo-Wang, and C.-T. James Huang. 2018a. Quantificational binding without c-command in Mandarin Chinese. Invited paper presented at the International Forum on Frontiers in Linguistics, BLCU, October 29-30, Beijing.China.
Lin, Jo-Wang, and C.-T. James Huang. 2018b. Constraints on anaphoric and bound pronouns in Mandarin Chinese. Paper presented at the 10th international conference of the European Association of Chinese linguistics, September 28-29, Universit degli Studi di Milano and Universit degli Studi di Milano-Bicocca, Milan, Italy.
Luo, Qiong-peng. 2011. *Mei* and *dou* in Chinese: a tale of two quantifiers. *Taiwan*

Journal of Linguistics, 9(2): 111-158.
May, Robert. 1977. *The grammar of quantification*. PhD dissertation, MIT.
Partee, Barbara. 1978/2004. Bound variables and other anaphors. In *Proceedings of TINLAP-2*, ed. by David Waltz, 79-85. University of Illinois. Also published in Partee (2004) Compositionality in Formal Semantics: selected papers by H. Partee,110-121. Blackwell Publishing.
Postal, Paul. 1971. *Cross-over phenomenon*. Reinhart and Winston: Holt.
Reinhart, Tanya. 1976. *The syntactic domain of anaphora*. PhD dissertation, MIT.
Reinhart, Tanya. 1983a. Coreference and bound anaphora: A restatement of the anaphora questions. *Linguistics and Philosophy,* 6(1): 47-88
Reinhart, Tanya. 1983b. *Anaphora and semantic interpretation*. Chicago: University of Chicago Press.
Shan, Chung-chieh, and Chris Barker. 2006. Explaining crossover and superiority as left-to-right evaluation. *Linguistics and Philosophy,* 29(1):91-134.
Teng, Elvin T.-H. 1985. Pronominal Anaphora in Chinese. Unpublished master thesis. National Taiwan Normal University, Taiwan.
Wasow, Thomas. 1972. *Anaphoric relations in English*. PhD dissertation, MIT.
Zhu, Shensheng. 1997. *A dynamic semantic theory of Chinese anaphora*. PhD dissertation, The University of Arizona.