

Interaction of *dou* and scope effects in Mandarin relative clauses*

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Abstract How to analyze the multi-functional focus-sensitive operator *dou* in Mandarin has been a long-standing debate (Lin 1998; Giannakidou & Cheng 2006; Xiang 2008; Liao 2011; Liu 2017, 2018; Xiang 2020, a.o.). In this paper, I provide novel arguments for the analysis of *dou* in analogy to *only* proposed in Xiang 2020, by examining the interaction of *dou* with scope effects in relative clauses embedded in different matrix clauses. I propose that the scope effects in RCs embedded in non-specificational sentences are derived from long QR of the embedded QP, while those in specificational sentences result from a natural-function analysis of the RC, which does not involve movement of the focus associated with *dou*. Crucially, the focus-semantics of *dou* blocks the former while is compatible with the latter. The puzzles and the proposed solution also adds new perspective into the more general question of focus-association with moved elements.

Keywords: scope ambiguity, scope islandhood, association with focus, focus-sensitive operators (*dou*, *only*, *even*)

1 Introduction

The particle *dou* is a well-known focus sensitive operator in Mandarin, and various analyses have been proposed to account for its different uses as well as the relationship among them (Lin 1998; Giannakidou & Cheng 2006; Xiang 2008; Liao 2011; Liu 2017, 2018; Xiang 2020, a.o.). Two recent analyses aim to provide a unified account for the different uses of *dou*. Liao (2011) and Liu (2017, 2018) treat *dou* as an *even*-like operator, while Xiang (2020) proposes an analysis in analogy to *only*. Examining the interaction of *dou* with scope effects in relative clauses, this paper provides novel evidence for the *only*-analysis.

It has been previously noticed that object relative clauses (*ORC*) in Mandarin admit the wide-scope reading and matrix-pronoun binding of the RC-embedded QP, but *dou*'s presence inside a relative clause (*dou-RC*) blocks the exceptional

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scope effects (Huang 1982; Aoun & Li 1993, 2003). However, I observe that the same *dou*-RC embedded in a specificational sentence admits a reading similar to the wide-scope reading and allows matrix-pronoun binding of the RC-embedded QP. **Section 2** discusses the crucial data in detail.

To account for the two puzzles, I propose in **Section 3** that the exceptional scope effects in RCs embedded in non-specificational sentences and those in specificational ones are derived from different mechanisms. Crucially, the focus semantics of *dou* under the *only*-analysis (Xiang 2020) blocks one of the mechanisms, while being compatible with the other. This leads to the contrast in the availability of exceptional scope effects with respect to the matrix clause type. The puzzles and the proposed solution suggest that the focus-sensitive operator *dou* cannot be associated with a (covertly) moved expression, resembling *only* in English, but not *even* (Erlewine 2018). Detailed discussion is presented in **section 4** before conclusion in **section 5**.

2 Data

In the Mandarin ORC in (1), the embedded subject QP, *every man*, can take wide scope over the RC-external QP, *one woman*, and bind a pronoun in the matrix clause, which the RC-embedded QP does not c-command itself (Huang 1982, 1983; Aoun & Li 1993, a.o.). When the RC-embedded QP takes narrow scope, we get the reading in (1a) and cannot get the bound reading for the matrix pronoun, while (1) can also have an inverse scope reading (1b), where the RC-embedded QP takes wide scope and is able to bind the matrix pronoun. Similar exceptional scope effects have also been observed in the English counterpart, as shown in (2).

- (1) *Mandarin ORC*
 [DP[RC **mei-ge** nanren₁ yaoqing ___ de] **yi-ge** nüren] yongbao-le ta_{1/2}.
 every-CL man invite DE one-CL woman hug-ASP 3SG
 a. ‘There is some pair $\langle x, y \rangle$ such that x is a woman invited by all men, and x hugged y .’ ($\exists > \forall$)
 b. ‘For every man x , a woman that x invited hugged x .’ ($\forall > \exists$)
- (2) *English ORC* (Sharvit 1999: 449 (8))
The picture of himself₁ which [**every** student]₁ hated annoyed **his**₁ friends.
 = ‘For every student x , the picture of x which x hated annoyed x ’s friends.’¹

However, when *dou* is present inside the ORC, as shown in (3), the RC-embedded QP can no longer take wide scope, nor bind the matrix pronoun (Huang 1982; Aoun

¹ The English ORC is also ambiguous, between a reading where the matrix pronoun is bound by the RC-embedded QP and a reading where the pronoun is free. Due to limited space, I only show the bound reading here.

& Li 1993, a.o.). The only available reading is the one shown in (3a), where the RC-embedded QP takes narrow scope and the matrix pronoun refers to someone else salient in the context.

(3) *Mandarin dou-RC*

[[[**mei-ge** nanren₁]_F **dou** yaoqing ___ de] **yi-ge** nüren] yongbao-le
 every-CL man DOU invite DE one-CL woman hug-CL

ta_{2/*1}.
 3SG

- a. ‘There is some y and a woman x invited by all men, and x hugged y .’
 $(\exists > \forall)$
- b. #‘For every man x , a woman that x invited hugged x .’
 $(*\forall > \exists)$

I observe that the same *dou-RC* embedded in a specificational sentence, such as (4), admits a reading similar to the wide-scope reading in (1b), as paraphrased in (4a). Despite the presence of numeral *one* in the containing DP, the most natural reading is that there is not just one woman being invited to the event, but rather, at least as many women as the number of men are invited, and each man, no matter how many women he invited, must have invited his mom. Following Jacobson 1994 and Sharvit 1999, I call it *multiple-individual reading* to distinguish it from real wide-scope reading for reasons to be clear in section 3.

(4) *Dou-RC embedded in a specificational sentence*

[[[**mei-ge** nanren₁]_F **dou** yaoqing ___ de] **yi-ge** nüren] shi **ta**_{1/2} mama.
 every-CL man DOU invite DE one-CL woman be 3SG mom

‘A woman that every man₁ invited is his_{1/2} mom.’

- a. ‘For every man x , x invited one or more women and among the women that x invited, there must be a woman who is x ’s mom.’² $(\approx \forall > \exists)$

At first sight, the contrast between (1) and (3) can be accounted for by a reconstruction-based story. The wide-scope reading of the RC-embedded QP in the ORC without *dou* (1b) is derived from reconstructing the RC-external numeral along with the RC-head NP back into the gap position, which is c-commanded by the RC-embedded QP, and the RC-embedded QP can then take wide scope over the reconstructed quantifier at LF. The absence of scope interaction in the *dou-RC* in (3) can then be due to that *dou* blocks the reconstruction.

² The sentence is also ambiguous between a reading where the matrix pronoun covaries the embedded QP and a reading where the pronoun is free. Only the paraphrase for the relevant covarying-reading is shown here due to space.

However, the reconstruction-based analysis does not directly predict the contrast between (3) and (4). It is unclear why *dou* only blocks reconstruction in non-specificational sentences (3), but not in the specificational ones (4). Furthermore, independent evidence shows that *dou* does not block reconstruction.

2.1 *Dou* does not block reconstruction

Empirical evidence from reconstruction effects shows that *dou* does not block reconstruction. First, *dou* does not block reconstruction for anaphora binding. As shown in the baseline case without *dou* (5), the third-person reflexive *ta.ziji* in the RC-head NP can only be co-indexed with the RC-embedded subject DP, *Zhang's mom*, but not with the more deeply embedded third-person expression, *Zhang*. Hence, the co-indexation 2 must not be due to that the antecedent linearly precedes the reflexive, but rather that the reflexive is interpretation at a position c-commanded by the antecedent; otherwise, the more deeply embedded *Zhang* should be able to bind the reflexive as well. The anaphora binding in (5) thus shows that the RC-head NP in Mandarin relative clauses can reconstruct.

- (5) *Baseline*
 wo renshi [DP[RC [**Zhang₁ de mama**]₂ yaoqing ____i de] [**ta.ziji**]_{2/*1} de
 1SG know Zhang DE mom invite DE 3SG.self DE
 xuesheng]_i].
 student
 'I know the student of herself_{2/*1} that [Zhang₁'s mom]₂ invited.'

An ORC with *dou* inside, as shown in (6), preserves the same co-indexation pattern. The third-person plural reflexive in the RC-head NP can still be bound by the plural subject DP inside the relative clause, but not by the more deeply embedded third-person plural expression *Zhang and Li*³. The anaphora binding in the presence of *dou* must also be due to reconstruction of the RC-head NP, instead of linear precedence of the antecedent, and thus, *dou* does not block reconstruction.

- (6) *Dou-RC*
 wo renshi [[[**Zhang he Li**]₁ **de pengyou-men**]₂]_F dou yaoqing ____i de]
 1SG know Zhang and Li DE friend-PL DOU invite DE
 [**tamen.ziji**]_{2/*1} **de xuesheng**]_i].
 3PL.self DE student
 'I know the student(s) of themselves_{2/*1} that [[Zhang and Li]₁'s friends]₂ invited.'

³ The subject DP is plural due to *dou*'s plurality requirement, which will be discussed in section 3. To match with the plurallity of the subject DP, I make the anaphor as well as the other potential antecedent, *Zhang and Li*, in plurality as well.

Second, scope interaction provides further evidence that *dou* does not block reconstruction. As observed in Aoun & Li 2003, a *dou*-RC admits scope interaction between a RC-embedded QP and a numeral embedded in the modifier of the RC-head NP, as shown in (7), but the wide-scope reading of the RC-embedded QP is not longer available for the same *dou*-RC when the RC-external numeral directly quantifies over the RC-head NP, as shown in (8).

- (7) *Numeral modifies the RC-head NP* (Aoun & Li 2003: 138 (11))
 [DP[RC [**mei-ge ren**]_F dou xihuan ___ de] [NP[**san-ge** zuojia xie de
 every-CL person DOU like DE three-CL writer write DE
 shu]].
 book
 ‘Books written by three authors that everyone likes.’
 a. ‘Books that are written by three authors and that everyone likes’ ($\exists > \forall$)
 b. ‘For every person *x*, (possibly different) three-author books that *x* likes’
 ($\forall > \exists$)
- (8) *Numeral quantifies the RC-head NP* (Aoun & Li 2003: 138 (12))
 [DP[RC [**mei-ge ren**]_F dou xihuan ___ de] **san-ge** [NP zuojia].
 every-CL person DOU like DE three-CL writer
 ‘Three authors that everyone likes.’
 a. ‘Three pre-existing authors that everyone likes’ ($\exists > \forall$)
 b. #‘For every person *x*, (possibly different) three authors that *x* likes’ ($*\forall > \exists$)

Under the story that scope interaction is derived from reconstruction of the RC-head and *dou* blocks reconstruction, the scope ambiguity in (7) is not expected. Since *dou* is present in both (7) and (8), the contrast in scope ambiguity must not be due to the presence of *dou*, but rather the difference between modifiers and quantifiers of the RC-head NP in their ability to reconstruct (see Wang 2021 for detailed arguments).

To summarize, the anaphora binding and scope interaction data presented in this subsection indicate that *dou* does not block reconstruction. Hence, the reconstruction-based story for scope effects in Mandarin ORCs shown in (1) is unable to capture the blocking effect of *dou* shown in (3) either. I argue for a novel solution for the puzzles in the next section.

3 Analysis

I propose that the scope effects in (1) (repeated below in (9)) and the multiple-individual reading in (4) (repeated below in (10)) are derived from different mechanisms.

(9) *Mandarin ORC*

[_{DP}[_{RC} **mei-ge** nanren₁ yaoqing ___ de] **yi-ge** nüren] yongbao-le **ta**_{1/2}.
 every-CL man invite DE one-CL woman hug-ASP 3SG
 ‘A woman that every man₁ invited hugged him_{1/2}.’ (∃ > ∀; ∀ > ∃)

(10) *Dou-RC embedded in a specificational sentence*

[[_{DP}[**mei-ge** nanren₁]_F dou yaoqing ___ de] **yi-ge** nüren] shi **ta**₁ mama.
 every-CL man DOU invite DE one-CL woman be 3SG mom
 ‘A woman that every man₁ invited is his₁ mom.’ (≈ ∀ > ∃)⁴

The scope interaction and matrix pronoun binding in (9) are derived from long QR of the embedded QP out of the ORC to [Spec, DP], as illustrated in (11). It c-commands the RC-external numeral *one* at LF, and thus takes wide scope, and since it is at the edge of the containing DP, it can also bind the matrix pronoun via the pronoun binding mechanism proposed in Büring 2004. I will show in subsection 3.2 that this step of long QR obeys the locality constraints on QR (Fox 2002; Cecchetto 2004, a.o.).

(11) [_{DP}<every man> [_{DP}[_{CP} Op [_C C_{+rel}] [_{TP} every man invited ____{Op}]]]
 [_D one-CL [_{NP} woman ____{CP}]]]

The relative clause in (10), on the other hand, can be analyzed as a set of natural-functions, giving rise to the multiple-individual reading (Jacobson 1994; Sharvit 1999). The interpretation of (10) under a natural-function analysis is shown in (12). I will show in section 3.3 that a natural-function reading is different from real scope taking, as first observed in Jacobson 1994, and only available in ORCs embedded in specificational sentences, as argued in Sharvit 1999.

(12) When defined, $\llbracket(10)\rrbracket = 1$ iff $\exists g. \text{NAT}(g) \wedge \forall x \in \text{DOM}(g) [\text{WOMAN}(g(x)) \wedge (\text{MAN}(x) \rightarrow \text{INVITE}(x, g(x)))] \wedge g = \lambda x \lambda y. \text{MOTHER-OF}(y, x)$

Crucially, the focus-semantics of *dou*, in particular its *non-vacuity presupposition* under the analysis proposed in Xiang 2020, blocks long QR, giving rise to the disappearance of scope effects in the *dou*-RC shown in (3) (repeated below as (13)). However, the non-vacuity presupposition can be satisfied in a natural-function RC, and thus *dou* does not block the multiple-individual reading in (10).

(13) *Mandarin dou-RC*

⁴ I only present the relevant covarying reading here due to space, and henceforth.

[[[**mei-ge** nanren₁]_F **dou** yaoqing ___ de] **yi-ge** nüren] yongbao-le
 every-CL man DOU invite DE one-CL woman hug-CL
ta_{2/*1}.
 3SG
 ‘A woman that every man invited hugged him_{2/*1}.’ (∃ > ∀; *∀ > ∃)

The detailed argument for *dou*’s incompatibility with long QR and its compatibility with natural-function analysis, along with detailed derivations for the scope effects will be presented in section 3.2 and 3.3 respectively. To provide some background for the proposed solutions, I first introduce the semantics of *dou* this paper adopts in the next subsection.

3.1 The semantics of *dou*

Xiang (2020) proposes a unified analysis in analogy to *only* for the multiple uses of *dou*. *Dou* is defined as a focus-sensitive exhaustifier, as shown in (14). Like *only*, it presupposes that the prejacent clause has at least one sub-alternative (*non-vacuity presupposition*), a weak alternative asymmetrically entailed by the prejacent clause as defined in (15). *Dou* then asserts that (i) the prejacent clause is true, and (ii) the exhaustification of each sub-alternative achieved by the *O*-operator defined in (16) is false.

$$(14) \quad \llbracket dou_C \rrbracket = \lambda p \lambda w : \exists q \in \text{SUB}(p, C). p(w) = 1 \wedge \\ \forall q \in \text{SUB}(p, C) [O_c(q)(w) = 0]$$

- a. Non-vacuity presupposition: The prejacent has at least one sub-alternative.
- b. The prejacent is true.
- c. Exhaustification of each sub-alternative is false.

$$(15) \quad \text{SUB}(p, C) = (C - \text{EXCL}(p, C)) - \{p\} = \{q | p \subset q, q \in C\}, \\ \text{where } \text{EXCL}(p, C) = \{q | p \not\subseteq q \wedge q \in C\}$$

$$(16) \quad O_C = \lambda p \lambda w : p(w) = 1 \wedge \forall q \in \text{EXCL}(p, C) [q(w) = 0] \\ \text{(Chierchia, Fox \& Spector 2012)}$$

The non-vacuity presupposition of *dou* gives rise to the well-known plurality requirement of *dou*. As shown in (17), the prejacent clause of *dou* with a plural associate, *John and Mary arrived* (17b), asymmetrically entails that *John arrived* and *Mary arrived*, as shown in (17d). The non-vacuity presupposition of *dou* is satisfied by the non-empty set of sub-alternatives, and thus the sentence is grammatical. By contrast, when the associate of *dou* is singular, as shown in (18), the prejacent clause (18a) does not asymmetrically entail anything, leading to an empty set of sub-alternatives (18c) and failure of the non-vacuity presupposition.

- (17) [John and Mary]_F dou arrived.
 a. LF: $\text{dou}_C[p[\text{John and Mary}]_F \text{ arrived}]$
 b. $\llbracket p \rrbracket = \text{ARRIVE}(j \wedge m)$
 c. $C = \{\text{ARRIVE}(x) \mid x_e \text{ is a relevant individual}\}$
 $= \{\text{ARRIVE}(j \wedge m), \text{ARRIVE}(j), \text{ARRIVE}(m) \dots\}$
 d. $\text{SUB}(\llbracket p \rrbracket, C) = \{\text{ARRIVE}(j), \text{ARRIVE}(m)\}$ (✓non-vacuity presup.)
- (18) *John_F dou arrived.
 a. $\llbracket p \rrbracket = \text{ARRIVE}(j)$
 b. $C = \{\text{ARRIVE}(j), \text{ARRIVE}(m), \text{ARRIVE}(a), \text{ARRIVE}(a \wedge b \wedge j) \dots\}$
 c. $\text{SUB}(\llbracket p \rrbracket, C) = \emptyset$ (✗non-vacuity presup.)

As will be shown in the following two subsections, the non-vacuity presupposition of *dou* is the key in solving the two puzzles on *dou*'s interaction with scope effects in relative clauses. The non-vacuity presupposition cannot be satisfied once the associate of *dou* undergoes QR out of the RC, while the natural-function analysis does not involve movement of the associate out of the preadjacent clause.

3.2 Long QR and *dou*

In this section, I argue that the RC-embedded QP undergoes long QR out of the ORC to take wide scope and bind the matrix pronoun at [Spec, DP], and show that this step of long QR does not violate the syntactic and semantic constraints on QR, but the non-vacuity presupposition of *dou* blocks this step of QR. Before going into details of my proposal, I first lay out some assumptions on Mandarin relative clauses, phasehood, and QR.

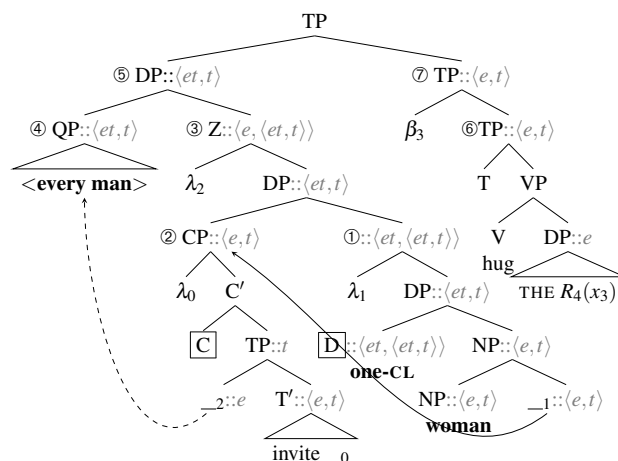
Following De Vries 2002, I assume that a prenominal pre-D RC in an SVO language is derived from moving the relative CP from a postnominal position to [Spec, DP], as shown by the solid arrow in the tree (21). Furthermore, since it has been independently argued that Mandarin has DP projection, even though it is an article-less language (Huang, Li & Li 2009, a.o.), in addition to CP and vP, DP is also a phase in Mandarin (Bošković 2014; Citko 2014; Aravind 2021, a.o.). The phase heads are boxed in (21). Mandarin numerals including classifiers have been argued to be in projections higher than NP (Aoun & Li 2003; Huang et al. 2009, a.o.), and for simplicity of illustration, I collapse them into the D-head in this paper.

Following Fox 2000 and Cecchetto 2004, I assume that QR as covert movement needs to obey both the Phase Impenetrability Condition (the PIC) (Chomsky 2000, 2001) and Scope Economy (Fox 1995). In other words, each step of QR cannot cross more than one phase head, and cannot be semantically vacuous.

- (19) *The (Weak) Phase Impenetrability Condition (PIC)*
The complement of a phase α is not accessible to operations when α occurs in the complement of a higher phase β .
- (20) *(Strong) Scope Economy*
In successive-cyclic QR, each step needs a motivation other than allowing further movement of the QP, such as resolving type mismatch, changing scope relations, or resolving ACD.

The proposed long QR of the RC-embedded QP, as illustrated by the dashed arrow in (21), obeys both the PIC and Scope Economy. Since the phase head D has already been circumvented by the movement of the relative CP, the step of long QR crosses only one phase head, C, obeying the PIC. After long QR to [Spec, DP], the QP now c-commands the RC-external numeral and thus is able to take wide scope, creating a new scope relation and obeying Scope Economy.

- (21) [[**mei-ge** nanren]₁ yaoqing ___ de] **yi-ge** nüren] yongbao-le **ta**_{1/2}.
every-CL man invite DE one-CL woman hug-ASP 3SG
'A woman that every man invited hugged him_{1/2}.' (∃ > ∀; ∀ > ∃)



To derive the wide-scope reading in, I adopt *argument saturation*, defined in (22), an operation proposed in Buring 2004 for QR in inverse linking and possessive constructions to composed the QRed QP with the rest of the DP.

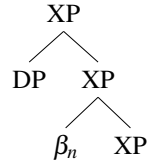
- (22) *Argument Saturation* (Buring 2004: 32 (16))
For any DP, any type T , and any $\llbracket Z \rrbracket^g \in D_{\langle e, \langle T, t \rangle \rangle}$,
 $\llbracket DP Z \rrbracket^g = \llbracket Z DP \rrbracket^g = \lambda \psi \in D_T. \llbracket DP \rrbracket^g(\lambda x. \llbracket Z \rrbracket^g(x)(\psi))$.

Then as shown in the step-by-step derivation in (23), the RC-embedded subj-QP interpreted at [Spec, DP] after long QR takes wide scope. The RC-containing DP thus has the wide-scope reading shown in (23e).

- (23) a. $[[\textcircled{1}]]^g = \lambda Q_{et}. \lambda P_{et}. \exists x [\text{WOMAN}(x) \wedge Q(x) \wedge P(x)]$ (By PA)
 b. $[[\textcircled{2}]]^g = \lambda x. \text{INVITE}(g(2), x)$ (By PA)
 c. $[[\textcircled{3}]]^g = \lambda y. \lambda P_{et}. \exists x [\text{WOMAN}(x) \wedge \text{INVITE}(y, x) \wedge P(x)]$ (By PA)
 d. $[[\textcircled{4}]]^g = \lambda Q_{et}. \forall z [\text{MAN}(z) \rightarrow Q(z)]$
 e. $[[\textcircled{5}]]^g = \lambda R_{et}. [[\textcircled{4}]]^g(\lambda u. [[\textcircled{3}]]^g(u)(R))$ (By Argument Saturation)
 $= \lambda R_{et}. [\lambda Q_{et}. \forall z [\text{MAN}(z) \rightarrow Q(z)]](\lambda u. [\lambda y. \lambda P_{et}. \exists x [\text{WOMAN}(x) \wedge \text{INVITE}(y, x) \wedge P(x)]](u)(R))$
 $= \lambda R_{et}. \forall z [\text{MAN}(z) \rightarrow \exists x [\text{WOMAN}(x) \wedge \text{INVITE}(z, x) \wedge R(x)]]$

The matrix pronoun binding is derived by the β -operator proposed in Büring 2004 for pronoun binding⁵, defined in (24).

- (24) *Pronoun Binding* (Büring 2004: 25(2))



where n is an index, DP occupies an A-position

$$[[\beta_n \text{ XP}]]^g = \lambda x. [[\text{XP}]]^{g[n \rightarrow x]}(x)$$

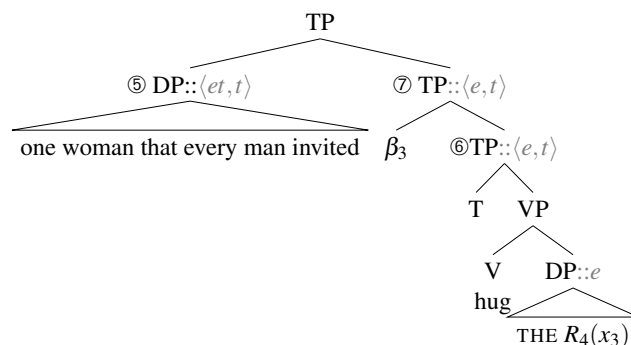
The matrix pronoun is then analyzed as an E-type pronoun (Evans 1980; Cooper 1997; Heim 1990; Heim & Kratzer 1998; Chierchia 1995, a.o.). Specifically, the pronoun consists of a definite article THE and a predicate containing two variables: a 2-place relation $R_{\langle e, \langle e, t \rangle \rangle}$ supplied by the context, and a variable x_e bound by the β -operator. The *Appropriateness Condition* defined in (25) guarantees the existence of the binder for R , and the context specifies a salient relation (Cooper 1997 a.o.).

- (25) *Appropriateness Condition* (Heim & Kratzer 1998: 292(6))
 A context c is appropriate for an LF ϕ only if c determines a variable assignment g_c whose domain includes every index with a free occurrence in ϕ .

The matrix pronoun binding is thus derived as follows in (26). The β -operator composes with the rest of the TP first (26d), the result of which then composes with the RC-containing DP (26e). The sentence (21) thus has an interpretation where the RC-embedded QP takes wide scope and binds the matrix pronoun.

⁵ Büring (2004) adds situations to E-type analysis and proposes a mechanism for situation binding (s-binding) parallel to that for (individual) pronoun binding (i-binding). Since the two binding mechanisms are parallel and the presence of situations is not the primary concern for the current paper, I adopt the pronoun binding with β -operator for simplicity in illustration henceforth, but the proposed analysis works as well when situation is included.

(26)



- a. Let us assume that $\llbracket R_4 \rrbracket^g = \lambda x_e. \lambda y_e. \text{MAN-THAT-INVITED-}x(y)$.
- b. $\llbracket x_3 \rrbracket^g = g(3)$
- c. $\llbracket \textcircled{6} \rrbracket^g = \lambda y. \text{HUG}(y, \text{THE } \llbracket R_4 \rrbracket^g(g(3)))$
- d. $\llbracket \textcircled{7} \rrbracket^g = \lambda u. \llbracket \textcircled{6} \rrbracket^{g[3 \rightarrow u]}(u)$ (By *Pronoun Binding*)
 $= \lambda u. [\lambda y. \text{HUG}(y, \text{THE } \llbracket R_4 \rrbracket^g(u))](u)$
 $= \lambda u. \text{HUG}(u, \text{THE } \llbracket R_4 \rrbracket^g(u))$
- e. $\llbracket \text{TP} \rrbracket^g = \llbracket \textcircled{6} \rrbracket^g(\llbracket \textcircled{7} \rrbracket^g)$
 $= \lambda K_{et}. \forall z [\text{MAN}(z) \rightarrow \exists x [\text{WOMAN}(x) \wedge \text{INVITE}(z, x) \wedge K(x)]]$
 $(\lambda u. \text{HUG}(u, \text{THE } \llbracket R_4 \rrbracket^g(u)))$
 $= 1 \text{ iff } \forall z [\text{MAN}(z) \rightarrow \exists x [\text{WOMAN}(x) \wedge \text{INVITE}(z, x) \wedge$
 $\text{HUG}(x, \iota y. \text{MAN-THAT-INVITED-}x(y))]]$

Having shown how the exceptional scope effects in an ORC without *dou* are derived via long QR, I now argue that the blocking effect of *dou* in (3) (repeated below as (27)) is attributed to the non-vacuity presupposition of *dou*. As discussed in section 3.1, the non-vacuity presupposition requires *dou* to be associated with a non-atomic expression, while long QR leaves *dou* to be associated with an atomic gap, violating the non-vacuity presupposition.

(27) *Mandarin dou-RC*

[[[**mei-ge** nanren₁]_F **dou** yaoqing ___ de] **yi-ge** nüren] yongbao-le
 every-CL man DOU invite DE one-CL woman hug-CL

ta_{2/*1}.

3SG

‘A woman that every man₁ invited hugged him_{2/*1}.’ ($\exists > \forall$; $*\forall > \exists$)

When the embedded QP does not undergo long QR and takes narrow scope, the *dou-RC* is interpretable. As shown in (28), the preadjacent clause of *dou* has at least one sub-alternatives, since the associate of *dou*, *every man*, is non-atomic. For example, *every man invited y* asymmetrically entails that *some man invited y*.

(28) *Derivation for (27) without long QR*⁶

Assuming $\llbracket C \rrbracket^g = C$, there is at least one g such that $\text{DOM}(\llbracket RC \rrbracket^g) \neq \emptyset$ because,

$$\text{a. DP} = [\text{DP}[\text{RC } \lambda_1 [\mathbf{dou}_{C\text{-}pro1} [\text{p } [\text{every man}]_F \text{invited } __1]]] [\lambda_0 [\text{D}' \text{ one } [\text{NP woman } __0]]]]$$

$$\begin{aligned} \text{b. } \llbracket RC \rrbracket^g &= \lambda y : \llbracket dou_{C\text{-}pro1} \text{p} \rrbracket^{g[1 \rightarrow y]} \text{ is defined. } \llbracket dou_{C\text{-}pro1} \text{p} \rrbracket^{g[1 \rightarrow y]} \\ &= \lambda y : \text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow y]}, C(y)) \neq \emptyset. \llbracket \text{p} \rrbracket^{g[1 \rightarrow y]} = 1 \wedge \\ &\quad \forall q \in \text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow y]}, C(y)) [O(q) = 0] \end{aligned}$$

c. For any y ,

$$\text{i. } \llbracket \text{p} \rrbracket^{g[1 \rightarrow y]} = 1 \text{ iff } \forall x [\text{MAN}(x) = 1 \rightarrow \text{INVITE}(x, \text{THE woman } y) = 1]$$

$$\text{ii. } C(y) = \{Q_{\text{ett}}(\lambda x. \text{INVITE}(x, \text{THE woman } y)) \mid Q_{\text{ett}} \text{ is a relevant quantificational expression}\}$$

$$\text{iii. } \text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow y]}, C(y)) \subseteq \{\llbracket \text{some man} \rrbracket(\lambda x. \text{INVITE}(x, \text{THE woman } y)) \dots\}$$

However, if the embedded QP was to undergo long QR in a *dou*-RC, as shown in the hypothetical structure in (29), *dou* is associated with a trace. Under trace conversion proposed in Fox 2002, it is interpreted as ‘THE man x ’⁷, as shown in (30c-i). Since the associate is atomic, it does not asymmetrically entail anything, as shown by the empty set of the sub-alternatives in (30c-iii), leading to failure of the non-vacuity presupposition of *dou*. The *dou*-RC is uninterpretable if the RC-embedded QP undergoes long QR out of the relative clause, and the wide-scope reading is therefore unavailable in a *dou*-RC.

(29) *dou*-RC after long QR

$[\text{DP} <\mathbf{every man}>_2 [\text{DP} [\text{RC} [\text{Op} <\text{woman}>]_1 [\text{TP } \mathbf{every man } \mathbf{dou} \text{invited } __1] \text{DE}] [\text{D}' \text{ one } [\text{NP woman}_1 \text{ } __RC]]]]$ hugged him₂.

(30) For any g , assuming $\llbracket C \rrbracket^g = C$, $\text{DOM}(\llbracket RC \rrbracket^g) = \emptyset$, because,

$$\text{a. DP} = [\text{DP} <\mathbf{every man}>_2 [\text{DP } \lambda_2 [\text{RC } \lambda_1 [\mathbf{dou}_{C\text{-}pro1} [\text{p } [__2]_F \text{invited } __1]]] [\lambda_0 [\text{D}' \text{ one } [\text{NP woman } __0]]]]]$$

$$\begin{aligned} \text{b. } \llbracket RC \rrbracket^g &= \lambda y : \llbracket dou_{C\text{-}pro1} \text{p} \rrbracket^{g[1 \rightarrow y]} \text{ is defined. } \llbracket dou_{C\text{-}pro1} \text{p} \rrbracket^{g[1 \rightarrow y]} \\ &= \lambda y : \text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow y]}, C(y)) \neq \emptyset. \llbracket \text{p} \rrbracket^{g[1 \rightarrow y]} = 1 \wedge \\ &\quad \forall q \in \text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow y]}, C(y)) [O(q) = 0] \end{aligned}$$

⁶ I simplify all the following denotations of the preajcent clause of *dou* by ignoring the world variables, following the examples provided in Xiang 2020.

⁷ More precisely, it should be ‘THE man $g(2)$ ’ in the interpretation of CP since the λ -abstract that binds the trace has not been introduced at this point. When the derivation reaches λ_2 at the edge of DP, the assignment function g assigns expression with index 2 to x . To be as close to the conventional denotation as possible, I use ‘THE student x ’ here and in the denotations (30c-i) and (40).

- c. For any y ,
- i. $\llbracket p \rrbracket^{g[1 \rightarrow y]} = 1$ iff INVITE (THE man x , THE woman y) = 1
 - ii. $C(y) = \{\text{INVITE}(z, \text{THE woman } y) \mid z \text{ is a relevant individual}\}$
 - iii. $\text{SUB}(\llbracket p \rrbracket^{g[1 \rightarrow y]}, C(y)) = \emptyset$

To summarize, this section has proposed a solution for the puzzle that *dou* blocks the wide-scope reading and matrix pronoun binding of the RC-embedded QP. The exceptional scope effects in an ORC without *dou* are derived from long QR of the embedded QP, which does not violate the PIC or Scope Economy due to the pre-determiner position of Mandarin relative clauses, and the semantics of *dou* blocks long QR, since the atomicity of the trace left by QR cannot satisfy the non-vacuity presupposition of *dou*. The next subsection solves the newly observed puzzle, the multiple-individual reading of a *dou*-RC embedded in a specificational sentence.

3.3 Natural-function analysis and *dou*

I argue in this section that the multiple-individual reading in (4) (repeated below in (31)) can be derived under a natural-function analysis of the *dou*-RC, and *dou* is compatible with the natural-function analysis, since there is no movement that leaves *dou* with an atomic associate.

(31) *Dou-RC embedded in a specificational sentence*

[[[**mei-ge** nanren₁]_F *dou* yaoqing ___ de] **yi-ge** nüren] shi **ta**₁ mama.
 every-CL man DOU invite DE one-CL woman be 3SG mom

‘A woman that every man₁ invited is his₁ mom.’ (≈ $\forall > \exists$)

Jacobson (1994) first proposes that relative clauses with quantifiers embedded in the subject position admits a natural-function reading, as shown in (32) for an English ORC.

(32) *Natural function RC* (Sharvit 1999: 475(70))

[_{DP}The **woman** [_{RC} **every man** invited ___]] is his mother.

a. $\iota f[\text{NAT}(f) \ \& \ \forall x[x \in \text{DOM}(f) \rightarrow \text{WOMAN}(f(x))] \ \& \ \forall x[\text{MAN}(x) \rightarrow \text{INVITE}(x, f(x))]] = \lambda x \iota z[\text{MOTHER-OF}(z, x)]$

b. ‘The unique natural function which maps every man to the woman he invited is the ‘mother-of’ function.’

The natural-function reading exhibits several properties that distinguishes it from a genuine wide-scope reading of the embedded QP, as argued in Jacobson 1994 and Sharvit 1999. First, natural-function RCs are only admitted in specificational

sentences. Since the specificational copula *be* and the determiner are assumed to be cross-categorial, they are not selective of the type of their arguments, as long as arguments connected by them match in type, while a non-specificational predicate of type $\langle e, t \rangle$ cannot be composed with a DP containing the natural-function RC, which is of type $\langle e, e \rangle$. Hence, the *dou*-RC embedded in a specificational sentence in (31) meets this requirement.

Furthermore, the uniqueness presupposition of the definite determiner of the RC-containing DP can be satisfied by the uniqueness of a natural-function, instead of the uniqueness of an individual. For example, (32) is felicitous in the context in (33) where some man invited more than one woman, as long as his mother is among the women he invited, since the definite determiner takes a set of natural functions, instead of entities, as its arguments, and its uniqueness presupposition can be satisfied by the existence of a unique function. Similarly, the Mandarin *dou*-RC embedded in a specificational sentence (33a) is also felicitous in the same context. However, the same ORC embedded in a non-specificational sentence not only does not admit covariance between the matrix pronoun and the embedded QP, but is not felicitous in the context regardless of the reference the pronoun, as shown in (33b).

(33) Context: John invited his own mother and Sally, Bill invited his own mother and Zoe, Jack invited his own mother...

a. *ORC with dou in a specificational sentence*

[DP_{[RC} [[**mei-ge nanren**]₁]_[+F] *dou* yaoqing ___ de] **yi-ge nüren**] shi
 every-CL man DOU invite DE one-CL woman be

ta₁ mama.

3SG mom

‘A woman that [every man]₁ invited was his₁ mother.’ (✓ multi-individual)

b. *ORC with dou in a non-specificational sentence*

#[DP_{[RC} [[**mei-ge nanren**]₁]_[+F] *dou* yaoqing ___ de] **yi-ge nüren**]
 every-CL man DOU invite DE one-CL woman

yongbao-le **ta**_{2/*1}.

hug-ASP 3SG

‘A woman [every man]₁ invited hugged him_{2/*1}.’

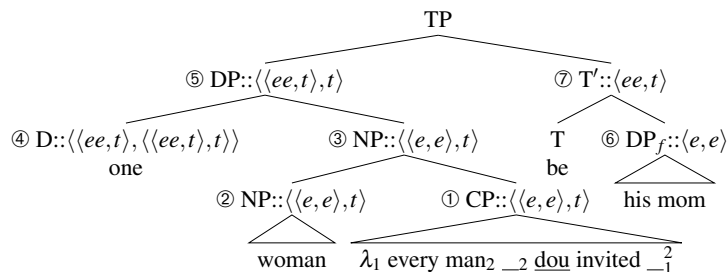
(* $\forall > \exists$)

Hence, the *dou*-RC embedded in a specificational sentence can be analyzed under the natural-function analysis, following Jacobson 1994. I will now show that *dou* is compatible with the natural-function analysis of (31). Relativization leaves behind a two-layered trace, which is bound by both the embedded QP and the relative operator, as shown in the LF of the *dou*-RC in (34a). Since the embedded QP does not move out of the relative clause, *dou* can be associated with a non-atomic expression, *every man*, which guarantees the set of sub-alternatives is not empty, as shown in (34c).

- (34) There is at least one g such that $\text{DOM}(\llbracket \text{RC} \rrbracket^g) \neq \emptyset$ because,
- $\text{DP} = [\text{DP}[\text{RC } \lambda_1 [\text{dou}_{\text{C-pro1}} [\text{p } [\text{every man}]_{\text{F}} _2 \text{ invited } _1^2]]] [\lambda_0 [\text{DP } \text{one} [\text{NP } \text{woman } _0]]]$
 - $\llbracket \text{RC} \rrbracket^g = \lambda f : \llbracket \text{dou}_{\text{C-pro1}} \text{p} \rrbracket^{g[1 \rightarrow f]}$ is defined.
 $\text{NAT}(f) \wedge \llbracket \text{dou}_{\text{C-pro1}} \text{p} \rrbracket^{g[1 \rightarrow f]}$
 $= \lambda f : \text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow f]}, \text{C}(f)) \neq \emptyset. \text{NAT}(f) \wedge (\llbracket \text{p} \rrbracket^{g[1 \rightarrow f]} = 1) \wedge$
 $\forall q \in \text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow f]}, \text{C}(f)) [\text{O}(q) = 0]$
 - For any f_{ee} ,
 - $\llbracket \text{p} \rrbracket^{g[1 \rightarrow f]} = 1$ iff $\forall x [\text{MAN}(x) = 1 \rightarrow \text{INVITE}(x, f(x)) = 1]$
 - $\text{C}(f) = \{Q_{\text{ett}}(\lambda x. \text{INVITE}(x, f(x))) \mid Q_{\text{ett}} \text{ is a relevant quantificational expression}\}$
 - $\text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow f]}, \text{C}(f)) \subseteq \{\llbracket \text{some man} \rrbracket(\lambda x. \text{INVITE}(x, f(x))), \dots\}$

The composition of the *dou*-RC in a specificational sentence is shown in (35). Since the operator *dou* does not affect the truth-condition of its prejacent clause, the presupposition of *dou* is satisfied in a natural-function RC, the interpretation of the relative CP (①) is abbreviated as in (35a) for space. As shown in (35i), we get the multiple-individual reading via a natural-function analysis of the *dou*-RC.

(35)



- $\llbracket \text{①} \rrbracket = \lambda f : \text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow f]}, \text{C}(f)) \neq \emptyset. \text{NAT}(f) \wedge (\llbracket \text{p} \rrbracket^{g[1 \rightarrow f]} = 1) \wedge$
 $\forall q \in \text{SUB}(\llbracket \text{p} \rrbracket^{g[1 \rightarrow f]}, \text{C}(f)) [\text{O}(q) = 0]$
 $\approx \lambda f. \text{NAT}(f) \wedge \forall x [\text{MAN}(x) \rightarrow \text{INVITE}(x, f(x))]$
- $\llbracket \text{②} \rrbracket = \lambda f. \forall x \in \text{DOM}(f) [\text{WOMAN}(f(x))]$
- $\llbracket \text{③} \rrbracket \approx \lambda f. \text{NAT}(f) \wedge \forall x \in \text{DOM}(f) [\text{WOMAN}(f(x)) \wedge$
 $(\text{MAN}(x) \rightarrow (\text{INVITE}(x, f(x))))]$
- $\llbracket \text{④} \rrbracket = \lambda P_{\langle ee, t \rangle}. \lambda Q_{\langle ee, t \rangle}. \exists g. P(g) \wedge Q(g)$
- $\llbracket \text{⑤} \rrbracket = \lambda Q. \exists g. \text{NAT}(g) \wedge \forall x \in \text{DOM}(g) [\text{WOMAN}(g(x)) \wedge$
 $(\text{MAN}(x) \rightarrow \text{INVITE}(x, g(x)))] \wedge Q(g)$
- $\llbracket \text{⑥} \rrbracket \approx \lambda x. \iota y. \text{MOTHER-OF}(y, x)$
- $\llbracket \text{T} \rrbracket = \lambda h. \lambda h'. h' = h$ (cross-categorial *be*)

- h. $\llbracket \textcircled{7} \rrbracket = \lambda h'.h' = \lambda x.\iota y.\text{MOTHER-OF}(y,x)$
- i. $\llbracket \text{TP} \rrbracket \approx 1$ iff $\exists g.\text{NAT}(g) \wedge \forall x \in \text{DOM}(g)[\text{WOMAN}(g(x)) \wedge (\text{MAN}(x) \rightarrow \text{INVITE}(x, g(x)))] \wedge (\lambda h'.h' = \lambda x.\iota y.\text{MOTHER-OF}(y,x))(g)$
 ≈ 1 iff $\exists g.\text{NAT}(g) \wedge \forall x \in \text{DOM}(g)[\text{WOMAN}(g(x)) \wedge (\text{MAN}(x) \rightarrow \text{INVITE}(x, g(x)))] \wedge g = \lambda x.\iota y.\text{MOTHER-OF}(y,x)$

To summarize, this section has argued that the multiple-individual reading in (4) is in fact a natural-function reading, instead of a reading derived by scope taking. Since there is no movement of the embedded QP, *dou* can still be associated with a non-atomic expression, and the non-vacuity presupposition is satisfied. Hence, the puzzle that *dou*-RC in a specificational sentence admits a reading similar to the exceptional scope effects that *dou* blocks in non-specificational sentences is also solved.

4 Alternative analyses

The analysis of *dou* assumed in this paper, the *only*-analysis proposed in Xiang 2020, is not the only analysis available for *dou*. Liao (2011) and Liu (2017) among others analyze *dou* in analogy to *even*. Based on the ambiguity in (36), Liu (2017) proposes that the *even*-meaning in (36a) is the primary use of *dou*, while the distributive reading in (36b) is derived via a covert DIST operator on VP, as defined in (37) following Link 1983, and trivializes the *even*-flavor.

- (36) *Amibiguity of dou* (Liu 2018: 819 (1))
 [san-ge xuesheng]_F dou mai-le shi-ben shu.
 three-CL student DOU buy-ASP ten-CL book
 a. *EVEN-dou*: ‘A group of three students together bought 10 books, which is unlikely.’
 b. *DIST-dou*: ‘The three students each bought 10 books.’

- (37) $\llbracket \text{DIST} \rrbracket = \lambda P.\lambda x.\forall y[(y \leq x \wedge \text{ATOM}(y)) \rightarrow P(y)]$

Liu (2017) defines *dou* as in (38), where *dou* does not alter the truth condition of its prejacent clause, but presupposes that its prejacent is the most unlikely proposition among its alternatives.

- (38) $\llbracket \text{dou } p \rrbracket$ is defined iff $\forall q \in C[p \neq q \rightarrow p \prec_{\text{likely}} q]$
 if defined, $\llbracket \text{dou } p \rrbracket = \llbracket p \rrbracket$

Under the distributive reading, the prejacent entails all of its alternatives, as shown in (39). If *p* entails *q*, *p* is at least as unlikely as *q* (Lahiri 1998; Crnič 2014). Hence, the presupposition of *even* on likelihood is weaker than entailment, and is automatically satisfied. The *even*-meaning is thus trivial under the distributive use of *dou*.

- (39) a. $\text{ALT}(\llbracket \text{three students}_F \rrbracket) = \{a \oplus b \oplus c, a \oplus b, b \oplus c, c \oplus a, a, b, c\}$
 b. $p = \forall y[y \leq a \oplus b \oplus c \wedge \text{ATOM}(y)] \rightarrow \exists x[\text{TEN-BOOKS}(x) \wedge \text{BOUGHT}(y, x)]$
 c. $C_{\text{sum}} = \{p, a \ \& \ b \ \text{each bought ten books, } b \ \& \ c \ \text{each bought ten books, } a \ \& \ c \ \text{each bought ten books, } a \ \text{bought ten books, } b \ \text{bought ten books, } c \ \text{bought ten books.}\}^8$

However, the puzzles considered in this paper cannot be easily solved under this analysis. Under the assumption that the trace left by long QR is atomic, *dou* is associated with an atomic expression after long QR. Since the *EVEN-dou* reading is not relevant here, we only consider the *DIST-dou* reading, where the *DIST* operator applies to an atomic entity. As shown in the derivation (40) for the *dou*-RC in (27), presupposition of *dou* is trivially satisfied, since the prejacent does not entail any alternative that is not itself.

- (40) For any g , assuming $\llbracket C \rrbracket^g = C$, $\text{DOM}(\llbracket \text{RC} \rrbracket^g) = \emptyset$, because
- a. $\text{DP} = [\text{DP} \langle \text{every man} \rangle_2 [\text{DP} \lambda_2 [\text{RC} \lambda_1 [\mathbf{dou}_{C\text{-}pro1} [p \text{ } __2]_F \text{invited } __1]]] [\lambda_0 [\text{D}' \text{one} [\text{NP} \text{woman } __0]]]]$
- b. $\llbracket \text{RC} \rrbracket = \lambda y : \llbracket \text{dou}_{C\text{-}pro1} p \rrbracket^{g[1 \rightarrow y]}$ is defined. $\llbracket \text{dou}_{C\text{-}pro1} p \rrbracket^{g[1 \rightarrow y]} = \lambda y : \forall q \in C[p \neq q \rightarrow p < \text{likely } q]. \llbracket \text{dou}_{C\text{-}pro1} p \rrbracket^{g[1 \rightarrow y]}$
- c. For any y ,
- i. $\llbracket p \rrbracket^{g[1 \rightarrow y]} = 1$ iff $\forall z[(z \leq \text{THE man } x \wedge \text{ATOM}(z)) \rightarrow \exists y[\text{INVITE}(\text{THE man } x, y) = 1]]$
- ii. $C(y) = \{p\}$
- iii. Since $\{q \in C \mid q \neq p\} = \emptyset$, *dou*'s presupposition is trivially satisfied.

Even if we don't assume that the trace is atomic, the *even*-analysis of *dou* still does not predict that *dou* blocks long QR. When *dou* is associated with a non-atomic trace, *dou* accesses the distributive reading with the presupposition non-trivially satisfied by the logic that entailment is stronger than likelihood discussed above.

Hence, a wide-scope reading of the embedded QP is predicted to be available in the *dou*-RC under the *even*-analysis of *dou*, contrary to fact. Interestingly, the behavior of *dou* being able to be associated with a movement trace under the *even*-analysis but not under the *only*-analysis is in line with the distinction between English *even* and *only* discussed in Erlewine 2018. Erlewine (2018) argues that *even*, but not

⁸ Liu (2018) argues that any alternative of the form *there are n students such that each bought 10 books* with $n > 3$ won't be included in the actual alternative set, because it does not make sense to consider such a proposition if we already know there could only be three students. This also explains the maximality effect of *dou*, i.e. the sentence 36 is infelicitous in a context where there were more than three students in the context. I adopt the same assumption in the following argument.

only, can be associated with a movement trace that has undergone trace conversion (Fox 2002). The difference is due to that *even* uses the focus alternatives only in its inference, which can be preserved by trace conversion, while *only* uses them in the assertion, which would lead to an uninterpretable assertion after trace conversion.

The *only*-analysis of *dou* as well as its ability to solve the puzzles on scope effects examined in this paper thus contributes additional evidence to the general question of focus-sensitive operators associating with moved elements. Not all focus-sensitive operators behave in the same way with respect to focus-association. It seems that whether trace conversion of the lower copy created by movement would affect focus-alternatives in the presupposition or assertion of the operators plays a crucial role in determining the association of the operators with moved focus.

5 Conclusion

This paper has proposed solutions to an existing puzzle, where *dou* inside an ORC blocks the wide-scope reading and matrix-pronoun binding of the embedded QP, and a related new observation, where *dou*-RCs embedded in specificational sentences admit a reading similar to the exceptional scope effects that *dou* blocks. By showing that the scope effects in non-specificational sentences are derived from long QR of the RC-embedded QP, while those in specificational sentences result from a natural-function analysis of the relative clause, I have argued that the two puzzles follow directly from the focus-semantics of *dou*, specifically the non-vacuity presupposition of *dou* as proposed in Xiang 2020.

Since long QR requires (covert) movement of the focus out of the scope of the focus-operator *dou*, *dou* would associate with a trace left by the movement in the former, but the trace left by QR of an *every*-NP is atomic and is not able to satisfy the non-vacuity presupposition. The natural-function analysis, by contrast, does not require movement, and thus, *dou* can be associated with a non-atomic QP inside the preadjacent clause, satisfying the non-vacuity presupposition.

The puzzles examined in this paper, along with the proposed solution, have further implications on more general questions. First, they are additional empirical evidence that relative clauses are not always scope islands, in line with recent observations discussed in Barker 2021 among others. Second, they provide a novel argument for the *only*-analysis of *dou* proposed in Xiang 2020. Lastly, they support the view that focus-sensitive operators are not uniform in their ability to associate with moved elements, and the focus-semantics of the operators, more specifically whether a trace after trace conversion would lead to clash in the presupposition or assertion, plays a crucial role.

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