

# Mandarin DP<sub>1</sub>-he-DP<sub>2</sub> in the Subject Position

Weifeng Han, Federation University of Australia  
Dingxu Shi, CLAL, Guangdong University of Foreign Studies, China

*Recent studies claim that, syntactically, he in DP<sub>1</sub>-he-DP<sub>2</sub> can only be analyzed as a conjunction or as a preposition, but not both, in the subject position in Mandarin. This paper presents both empirical and theoretical arguments against such singular analyses of he. Drawn upon cross-linguistic evidence, we argue that he is open to both a conjunction and a preposition analyses. Under the Merge theory, it is argued that the prepositional phrase (PP) is derived through only EXTERNAL MERGE (EM), while the conjunction phrase (&P) is yielded through EM and then INTERNAL MERGE (IM). Therefore, PP and &P undergo different processes of labelling. The Phase Impenetrability Condition helps explain the topicalization and focus marking issues by the singular analysis of he as a preposition only. This paper illustrates how the same lexical item of he is used for both the conjunction and the comitative structures in Mandarin, and how both structures differ syntactically under the Merge theory.*

**Keywords:** Mandarin, he, conjunction, preposition, merge

## 1 Introduction

Example (1) shows the first line in Mandarin of the theme song of 2008 Beijing Summer Olympic Games - *You and Me*, with *woheni* (you-and-I) in the subject position.

- (1) a. [Wo he ni] xin lian xin.  
I and you heart connect heart  
'You and I are connected.'
- b. [Wo] [he ni] xin lian xin.  
I with you heart connect heart  
'I am connected with you.'

Structurally, *he* in DP<sub>1</sub>-*he*-DP<sub>2</sub><sup>1</sup> in the subject position is open to the analysis of either a conjunction, such as in (1)a, or a preposition, such as in (1)b, in Mandarin Chinese (Lü 1999: 265-266; Zhu 1982: 176). Correspondingly, the 'conjunctive' meaning accompanies the conjunction analysis, while the 'comitative' meaning accompanies the preposition analysis (Goodall 2017; Stassen 2000).<sup>2</sup>

<sup>1</sup> Within the DP-hypothesis (e.g., Abney, 1987), NPs without articles are assumed to have null D, which is PF-based (see Baker 2003, Bošković 2005, Chierchia 1998, Corver 1992, Fukui 1988, for exceptions). Recent typological studies argue there are fundamental differences between typical NPs and DPs, which calls for a closer and more cautious look at the determiners and its relation to the following NPs crosslinguistically (e.g., Bošković 2008, Salzmann 2017, Willim 2000). In formal semantics, N, or NP, is also favoured for the nominals in the N-and-N noun coordination structure (e.g., Champollion 2016, Winter 1995, 1998). Following the tradition, with no intention for further theoretical argument, DP<sub>1</sub>-*he*-DP<sub>2</sub> is used in this paper to refer to the *he* coordination of two nominals in modern Chinese, as contrast to those of two adjectives, or of two adverbs.

<sup>2</sup> However, it only falls into the analysis of conjunction if the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure is in the object position (Liu 2003), such as in (i). Cross-linguistically, the conjunction reading is preferred for similar structures in the object position (e.g., Ionin & Matushansky 2002).

(i) Daiyu zhuangjian le [baoyu he baochai].

Recent arguments (e.g., Yang & Hu 2018; Zhang 2010), however, have proposed a singular, rather than a dual, analysis of DP<sub>1</sub>-*he*-DP<sub>2</sub> in the subject position. Specifically, it is proposed that the corresponding *he* should be analyzed either as a conjunction, or as a preposition, but not both. The singular analysis involves a series of syntactic tests of the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure, including its ability to be topicalized, to be focus marked, or to be negated. Nevertheless, the results contradict each other. While Zhang (2010) proposed a unified conjunctive analysis, Yang and Hu (2018) argued that *he* in the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure in the subject position can only be analyzed as a preposition. This paper will review both singular analyses of *he*. Empirical evidence will be reviewed to argue against the singular analyses. Drawn upon cross-linguistic evidence, it is argued a dual analysis of *he* is favored. Under the MERGE theory (Chomsky 1995, 2000, 2008, 2013, 2015), it is argued that, in Mandarin Chinese, *he* in DP<sub>1</sub>-*he*-DP<sub>2</sub> in the subject position has indeed the syntactic status of either a conjunction or a preposition. Its corresponding syntax decides if the structure (as well as the DPs within the structure) can be topicalized, focus marked, or negated.

We will start reviewing, in section 2, the singular analysis of *he* as a conjunction only and that of *he* as a preposition only. Section 3 presents empirical evidence from Mandarin that challenges both the singular analyses. Based on section 3, further cross-linguistic evidence presented in section 4 shows that *he* in the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure in the subject position is indeed open to both the interpretation of it being a conjunction and a preposition. The syntax of DP<sub>1</sub>-*he*-DP<sub>2</sub> is depicted and explained in section 5 in terms of internal and external merge. The inadequacy and fallacy of the singular analyses are accounted for under the Merge theory. Following this is a short conclusion in section 6.

## 2 The singular analysis of *he*

### 2.1 The singular analysis of *he* as a conjunction

Following the theoretical assumption that *he* is the head of the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure in Mandarin, Zhang (2010) proposed a unified analysis of *he* as a conjunction. Therefore, comitative or conjunctive, *baoyu* and *daiyu* in (2), for example, are the two conjuncts of *he* (and) as a conjunction, while the analysis of *he* (with) as a preposition is not possible (Zhang 2010: 84-88).

- (2) Baoyu he Daiyu he-mai le yi liang che.  
 Baoyu and Daiyu co-buy ASP one CL car  
 ‘Baoyu and Daiyu bought a car together.’

There are multiple reasons why *he* cannot be analyzed as a preposition according to Zhang (2010). For example, a PP modifier of a nominal must occur to its left in Chinese and the function word *de* must be present. Apparently, if it is a PP complement of DP<sub>1</sub>, *he*-DP<sub>2</sub> occurs to the right of DP<sub>1</sub> in (2), and *de* is absent. Therefore, it is unlikely that *he*-DP<sub>2</sub> is an argument or a modifier of DP<sub>1</sub> (Zhang 2010: 86). Also, DP<sub>1</sub>-*he*-DP<sub>2</sub> fails, especially with a distributive

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Daiyu catch ASP Baoyu and Baochai  
 ‘Daiyu caught Baoyu and Baochai (by surprise).’

The following abbreviations are used in glosses: ASP: aspect marker, CL: classifier, DE: morpheme *de*, TM: topic marker.

interpretation, to pass the tests of verb raising, adverbial insertion, and negation (including the A-not-A form) (Zhang 2010: 62-96), as exemplified in (3)-(6) below (adapted from Zhang 2010, e.g., (211a), (216a), (218a) and (225a)).

- (3) (*verb raising*)  
 \*Baoyu yinggai he Daiyu gezi zai xie zuoye.  
 Baoyu should and Daiyu separately ASP write homework  
 ‘Baoyu and Daiyu should be writing homework separately now.’
- (4) (*adverbial insertion*)  
 \*Baoyu zuotian he daiyu gezi qu le taiguo.  
 Baoyu yesterday and Daiyu separately go ASP Thailand  
 ‘Baoyu and Daiyu went to Thailand separately yesterday.’
- (5) (*negation*)  
 \*Baoyu mei he daiyu fenbie mai yi liang che.  
 Baoyu not and Daiyu respectively buy one CL car  
 ‘Baoyu and Daiyu did not respectively buy a car.’
- (6) (*A-not-A*)  
 \*Baoyu he-mei-he daiyu fenbie jiehun?  
 Baoyu and-not-and Daiyu respectively marry  
 ‘Did Baoyu and Daiyu get married, respectively?’

## 2.2 The singular analysis of *he* as a preposition

Also assuming a singular analysis of *he*, contra Zhang’s (2010) unified conjunction analysis, Yang and Hu (2018) proposed a unified preposition analysis. They argued that *he* in DP<sub>1</sub>-*he*-DP<sub>2</sub> in the subject position in Mandarin can be analyzed only as a preposition. Their argument was based on the fact that DP<sub>1</sub> can be topicalized but neither DP<sub>1</sub> nor DP<sub>2</sub> can be focus marked.

Based on the English examples in (7) below, Yang and Hu claimed that no nominals on either side of a true conjunction can be topicalized as evidenced in (7)b and (7)c.

- (7) a. John and Mary are studying in two different schools.  
 b. \*John, I think *t* and Mary are studying in two different schools.<sup>3</sup>  
 c. \*Mary, I think John and *t* are studying in two different schools.

However, the fact that (8)b is acceptable, according to Yang and Hu, means *he* is not a conjunction, and the only solution here is to reanalyze *he* as a preposition only.<sup>4</sup>

<sup>3</sup> Yang and Hu did not explain the motivation behind the insertion of *I think* in (7)b and (7)c considering they are the topicalization derivations based on (7)a where *I think* was not in the original sentence (it is the same to *worenwei* (I think) in the Chinese equivalents of (8)b and (8)c as compared to (8)a). With or without *I think* / *worenwei*, our comment and discussion regarding (7) and (8) remain the same.

<sup>4</sup> In an extended footnote in Yang and Hu’s argument (2018: 61), rather confusingly, the authors admitted that ‘*he* in (8)a may potentially have multiple readings...according to Zhu’s (1982: 176) argument exchange test of conjunctions, there is no semantic difference to (8)a if *John* and *Mary* are changed positions...also (Yang and Hu’s own acceptability tests showed) participants strongly rejected *he* being interpreted as a preposition even if they were primed under substantial contexts directly pointing to a prepositional reading of the sentence...’. Such

- (8) a. Yuehan he mali zai butong de xuexiao xuexi.  
John and Mary in different DE school study  
'John and Mary are studying in two different schools.'
- b. Yuehan, wo renwei *t* he mali  
John I think *t* and Mary  
zai butong de xuexiao xuexi.  
in different DE school study  
'John, I think *t* and Mary went to the different schools (together).'
- c. \*Mali, wo renwei yuehan he *t*  
Mary I think John and *t*  
zai butong de xuexiao xuexi.  
in different DE school study  
'Mary, I think John and *t* are studying in two different schools.'

It was further argued, based on the English examples of (9)a-d, neither the nominals on either side of a true conjunction can be focus marked (<sub>F</sub>). However, the acceptability of (10)a and (10)c proves that *he* can only be a preposition in DP<sub>1</sub>-*he*-DP<sub>2</sub> in the subject position in Mandarin.

- (9) a. \*Only [John]<sub>F</sub> and Mary are studying in two different schools.  
b. \*Only John and [Mary]<sub>F</sub> are studying in two different schools.  
c. \*John only and [Mary]<sub>F</sub> are studying in two different schools.  
d. \*John and only [Mary]<sub>F</sub> are studying in two different schools.
- (10) a. Shi/zhiyou [yuehan]<sub>F</sub> he mali  
only John and Mary  
zai butong de xuexiao xuexi.  
in different DE school study  
'Only [John]<sub>F</sub> and Mary are studying in two different schools.'
- b. \*Shi/zhiyou yuehan he [mali]<sub>F</sub>  
only John and Mary  
zai butong de xuexiao xuexi.  
in different DE school study  
'Only John and [Mary]<sub>F</sub> are studying in two different schools.'
- c. Yuehan shi/zhi<sup>5</sup> he [mali]<sub>F</sub>  
John only and Mary  
zai butong de xuexiao xuexi.  
in different DE school study  
'John only and [Mary]<sub>F</sub> are studying in two different schools.'
- d. \*Yuehan he shi/zhi [mali]<sub>F</sub>  
John and only Mary

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a fact is contradictory to Yang and Hu's claim. It shows that there is psychological evidence that conjunction is a preferred reading of *he* when the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure is open to multiple analyses.

<sup>5</sup> Yang and Hu used *zhiyou* in (10)a and (10)b but *zhi* in (10)c and (10)d without explanation. While it does not change the acceptability of (10)c and (10)d in this case, it is suggested to be cautious as per the interchanging use of *zhi* and *zhiyou/zhishi*, since their syntactic and semantic performances can be fundamentally different in modern Chinese (Han 2016, 2018).

zai butong de xuexiao xuexi.  
in different DE school study  
‘John and only [Mary]<sub>F</sub> are studying in two different schools.’

It was concluded in Yang and Hu’s (2018) that *he* in the subject position is only a preposition. The possibility of *he* being a conjunction was ‘summarily rejected’. It was then argued that the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure is a SECONDARY PREDICATION (SP) construction in the form of [DP<sub>1i</sub> [SP PRO<sub>i</sub> [he DP<sub>2</sub>]]]. Under such an SP construction analysis, DP<sub>2</sub> first merges with the *PRO*, which is controlled by DP<sub>1</sub>. In this sense, DP<sub>1</sub>, such as *yuehan* (John) in (12), is raised to Spec-CP to fill in the subject position, leaving the whole structure falling into an SP analysis.

### 3 Empirical evidence against the singular analysis of *he*

#### 3.1 Evidence against the singular conjunctive analysis of *he*

The singular analysis of *he* as a conjunction is empirically challenged. For example, *he*-DP<sub>2</sub> as a PP modifying DP<sub>1</sub> can appear on its left with *de* being present through relativization, as evidenced in (11) below.

- (11) He mianbao yiqi kao de bingan  
with bread together bake DE biscuit  
yijing chi wanle.  
already eaten ASP  
‘The biscuits that were baked with the bread are already eaten.’

Furthermore, the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure can undergo verb raising, adverbial insertion, negation, and the A-not-A form, as shown in (12).

- (12) Baoyu <sup>a</sup>keneng/<sup>b</sup>yijing/<sup>c</sup>mei/<sup>d</sup>hebuhe  
Baoyu might/already/not/and-not-and  
he Daiyu gezi qu le butong de guojia.  
and Daiyu respectively go ASP different DE country  
<sup>a</sup>‘Baoyu and Daiyu might have gone to different countries.’  
<sup>b</sup>‘Baoyu and Daiyu have already gone to different countries.’  
<sup>c</sup>‘Baoyu and Daiyu haven’t gone to different countries.’  
<sup>d</sup>‘Have Baoyu and Daiyu gone to different countries or not?’

Empirically, (3) and (4) are also acceptable if the sentence-initial *baoyu* is read as a topic (occupying the Spec-CP, rather than the Spec-IP, position), as illustrated in (13) and (14).

- (13) Baoyu (ne)<sup>6</sup>, yinggai he daiyu gezi zai xie zuoye.  
Baoyu TM should and Daiyu separately ASP write homework  
‘Baoyu and Daiyu should be each writing homework (now).’

<sup>6</sup> Topic markers in Chinese can be silent (Han, Arppe & Newman 2017; Han & Shi 2016; Xu & Liu 2007).

- (14) Baoyu (ne), zuotian he daiyu gezi qu le taiguo.  
 Baoyu TM yesterday and Daiyu separately go ASP Thailand  
 ‘Baoyu and Daiyu each went to Thailand yesterday.’

As for (5) and (6), their unacceptability comes from the semantic anomaly (Weinreich 1972: 39-40) between *fenbie* (respectively) and the two VPs: *mai yiliangche* (bought one car) and *jiehun* (get married). The affirmative equivalents of (5) and (6) are not acceptable, either, as shown in (15) and (16).

- (15) \*Baoyu he daiyu fenbie mai yi liang che.  
 Baoyu and Daiyu respectively buy one CL car  
 ‘Baoyu and Daiyu respectively bought a car.’

- (16) \*Baoyu he daiyu fenbie jiehun?  
 Baoyu and Daiyu respectively marry  
 ‘Did Baoyu and Daiyu get married, respectively?’

In addition, following the topic analysis in (13) and (14), *he-daiyu* (with-Daiyu) can be topicalized, as shown in (17). The topicalized *he-daiyu* falls into the PP analysis, where *he* is a preposition instead of a conjunction.

- (17) He daiyu (ne), baoyu he-mai le yi liang che.  
 with Daiyu TM Baoyu co-buy ASP one CL car  
 ‘Together with Daiyu, Baoyu bought a car.’

### 3.2 Evidence against the singular prepositional analysis of *he*

According to Yang and Hu, the intention of the singular analysis of *he* as a preposition was to contrast Chinese with English, and to provide a theoretically simpler and more unified explanation to ‘predict’ the syntax of the linking words between DP<sub>1</sub> and DP<sub>2</sub> in the subject position in Mandarin (Yang & Hu 2018: 64-68). One of their arguments was that DP<sub>1</sub> allows for topicalization in Chinese, but not in English.

However, unlike there are strong syntactic constraints on the coordination structure in English (e.g., Ross 1967: 89), movement of the DPs of a conjunction in Asian languages, such as topicalization, are more pragmatically, rather than syntactically, constrained (Kehler 2002; Kubota & Lee 2015). Therefore, (8)b being acceptable is not enough to prove that *he* can only be analyzed as a preposition.<sup>7</sup>

Unfortunately, in their argument of *he* being a preposition only in (7)-(10), Yang and Hu did not include two obvious cases of topicalization and focus marking, where *he* falls well into the conjunction analysis, as evidenced in (18) and (19).

- (18) a. Yuehan he mali a t  
 John and Mary TM t

<sup>7</sup> Furthermore, empirically, the singular preposition analysis will not correctly predict the syntax of the linking word *ji* (and), as evidenced in (34) and (35) as discussed in the next section, since it cannot be used as a comitative preposition in the same structure in Mandarin.

zai butong de xuexiao xuexi.  
in different DE school study  
‘(As for) John and Mary, they are studying in two different schools.’

- (19) a. Shi/zhiyou [yuehan he mali]<sub>F</sub>  
only John and Mary  
zai butong de xuexiao xuexi  
in different DE school study  
‘Only [John and Mary]<sub>F</sub> are studying in two different schools.’

Another unfortunate overlook in Yang and Hu’s singular analysis of *he* as a preposition only is it fails to acknowledge the typological differences in the syntactic structures between English and Chinese. For example, under the singular analysis of *he* as a preposition, the argument was that no conjuncts of a true conjunction allow topicalization (Yang and Hu 2008), (e.g., (7)a-b). Therefore, (8)b being acceptable proves *he* is a preposition only. First, traditional grammar proposes that while a gap related to the topic is allowed in some cases, in others ‘a resumptive pronoun is the only choice and a gap will render the topic-comment construction unacceptable’ (Shi 2000: 398). Put the pronoun *he* in the gap in (7)a, then (20) is well acceptable.

- (20) (As for) John, I think *he* and Mary are studying in two different schools.

Under the X-bar theory, English is subject to the EXTENDED PROJECTION PRINCIPLE (EPP) (Chomsky 1981, 1982). EPP prescribes that ‘the subject of a clause is obligatory in English and similar languages.’ (Chomsky 1981: 40). In other words, the specifier of TP or IP must be occupied (also see Chomsky 2000; Lasnik 2001a, 2001b, 2003; Lasnik & Park 2003). Alexiadou and Anagnostopoulou (1998) propose that there are two different kinds of languages with respect to EPP: those where X<sup>0</sup> movement suffices versus those where only an XP can satisfy EPP. Typologically, therefore, English is of the latter type, and Chinese belongs to the first type, which does not have rich agreement. It has its theta-directionality and case-directionality set differently (Koopman 1984; Travis 1984), but still allows for *pro*-drop and accommodate under the licensing theory (Huang 1984, 1987). For this reason, a sentence without a PF-based generalized form (see Chomsky 1995) of the subject is allowed in Chinese, such as in (8)b.

## 4 Cross-linguistic evidence for the dual analysis of *he*

### 4.1 Evidence for *he* as a conjunction

Syntactic coordination refers to the juxtaposition of two syntactic elements - conjuncts (often of the same category). For example, *John* and *Mary* in (21) are linked by the conjunction *and* (Goodall 2017: 2).

- (21) John and Mary entered the room.

Though not without exceptions, most languages have the same coordination structure as *John and Mary* above. It can be found in the subject position with one nominal on the left, and the other on the right, of the conjunction, as illustrated in examples (22)-(26).

- (22) El y yo estamos hablando. (Spanish)  
 he and I are speaking  
 ‘He and I are speaking.’ (Goodall 2017)
- (23) ‘ima’ totimho ‘yam niq ‘itana taatapiy qöya. (Hopi)  
 these boys and our father cottontail kill  
 ‘These boys and our father killed cottontails.’ (van Oirsouw 1987)
- (24) Han og meg var sammen om det. (Norwegian)  
 he and I were together about it.  
 ‘He and I were on it together.’ (Johannessen 1998)
- (25) Piléké rí wowúlénéré mué he bakse. (Sissala)  
 chameleon and spider went put farms  
 ‘The chameleon and the spider went and made their farms.’ (Blass 1989)
- (26) Gatalen zel-banaat we l-walad zel-bisse. (Palestinian Arabic)  
 killed the-girls and the-boy the-cat  
 ‘The girls and the boy killed the cat.’ (Aoun, Benmamoun & Sportiche 1994)

The two conjuncts on either side of *and* are typically symmetric to each other, not only syntactically but also semantically (Goodall 2017: 4-5). In Mandarin Chinese, the *and* equivalent conjunction is typically *he*. Empirically, DP<sub>1</sub>-*he*-DP<sub>2</sub> is the commonest conjunctive coordination which can appear in both the subject and the object positions of a Chinese sentence, for example (27) and (28) below.

- (27) Yuehan he mali jin le fangjian.  
 John and Mary enter ASP room  
 ‘John and Mary entered the room.’
- (28) Wo jian dao-le yuehan he mali.  
 I meet ASP John and Mary  
 ‘I met John and Mary.’

Under the conjunctive analysis, (27) (as well as in its English equivalent of (21)) and (28) have the meaning of ‘John entered the room and Mary entered the room’, and ‘I met John and I met Mary’, respectively. In other words, the DPs in such coordination structures are ‘distributive’ to the VP (Flor et al. 2017).

#### 4.2 Evidence for *he* as a preposition

Early texts examining conjunctions and prepositions indicated a relationship between conjunctive and comitative constructions (e.g., Jespersen 1924: 90). In English, for example,



the comitative *with* often corresponds to the conjunctive *and* (Goodall 2017: 1). For example, (29) below can be read as (30) (Goodall 2017: 17). Diachronically, the Chinese conjunctive construction (with *he* as a conjunction) is derived from its comitative construction (with *he* as a preposition) (Peyraube 1996). As a result, *he* can introduce a comitative nominal in modern Chinese, and it is usually translated as *with*, or *and*, depending on its function. The very first example in this paper shows that both ‘You and I’ or ‘I with you’ readings are possible in the subject position.

(29) I went to the movies with John.

(30) John and I went to the movies.

From the cross-linguistic perspective, the ‘linking’ words of both the conjunctive and the prepositional constructions share the same phonetic and morphological form (Mithun 1988: 339, 349). Typologically, in both left- and right-branching languages, it is not uncommon a conjunction (with the conjunctive meaning) is also used as a preposition (with the comitative meaning), as shown in (31) to (33).

- (31) a. e-yi            kple            wo. (Ewe)  
          she-go        with            you  
          ‘She went with you.’  
       b. Kofi kple Kosi va egbe.  
          Kofi and Kosi come today  
          ‘Kofi and Kosi came today.’ (Heine & Kuteva 2002: 80)

- (32) a. elongó        na        bongó. (Lingala)  
          together    with    them  
          ‘Together with them’  
       b. bisó        na        ye.  
          he            and    I  
          ‘He and I’ (van Everbroeck 1958: 72)

- (33) a. avo-’a        ’e’. (Yagaria)  
          father-his    with  
          ‘With his father’  
       b. dagae ’e’    yale-di        ’e’.  
          I            and    people-my    and  
          ‘My people and I’ (Renck 1975: 43)

As explained earlier, historically, the conjunctive use in Chinese is derived from its prepositional use (also see Tao 1991). The grammaticalization path of conjunctions in Chinese is depicted as ‘verb > preposition > conjunction’ (Liu & Peyraube 1994). Cross-linguistically, there has been sufficient evidence proving such a cline of categoriality (Hopper & Traugott 2003: 107) from major categories (e.g., verb or preposition) to minor ones (e.g., conjunction) (see Amfo 2010; Gaeta 2003, for examples of German and Kwa). Empirically, as exemplified in (34) and (35), there are other words that have both the comitative and the conjunctive uses

in Chinese, such as *gen*, *tong*, *yu*, while some others can only be used as a conjunction, for example, *ji*, or as a preposition, such as *bang*.<sup>8</sup>

- (34) Baoyu *he/gen/tong/yu/ji/\*bang*      daiyu   he-mai le      yi      liang   che.  
Baoyu and      Daiyu   co-buy ASP      one      CL      car  
‘Baoyu and Daiyu bought a car together.’
- (35) He/gen/tong/yu/\*ji/bang      daiyu, baoyu   he-mai le      yi      liang   che.  
with      Daiyu   Baoyu   co-buy ASP      one      CL      car  
‘Together with Daiyu, Baoyu bought a car.’

As evidenced in the above examples, *he* can be analyzed as a preposition with the comitative meaning in Mandarin.

## 5 The syntax of DP<sub>1</sub>-*he*-DP<sub>2</sub>

### 5.1 PP and &P through internal and external Merge

In order to justify the dual use of *he* as a conjunction and a preposition, it benefits us to clarify the syntactic derivations of both the conjunction phrase (&P) and the preposition phrase (PP).

Transformational rules (Chomsky 1957: 33-36) propose that coordination takes two sentences S1 and S2, with the only difference between is that S1 takes constituent X (as, for example, its subject or object) and S2 takes Y (as of the same category as X). The coordination structure of S3, therefore, is the result of the replacement of X with X-and-Y in S1 (or S2) (also see Gleitman 1965; Goodall 1987; Ross 1986; van Oirsouw 1987; Wesche 1995; Wilder 1995).

Under the MINIMALIST PROGRAM (Chomsky 1995), therefore, it is proposed that constituents X and Y, of both contiguous and non-contiguous relations, can be unified as a new constituent Z through a computational procedure called MERGE, which itself involves no further computation, as illustrated in (36).

- (36) MERGE (X, Y) = Z  
Z = {X, Y}

The important is, there are two types of MERGE: INTERNAL MERGE (IM) and EXTERNAL MERGE (EM). IM is a result of MERGE (X, Y), in which there are two copies of Y, ‘one the original one remaining in X, the other the copy merged with X’ (Chomsky 2013: 40). Therefore, *What was hit what?* (as the underlying structure of *What was hit?*) is an example of IM, in which *what* is the copy of Y. EM also results from MERGE (X, Y). However, neither X nor Y is part of the other (Chomsky 2013: 40). For example, combining *hit* and *the ceiling* to form the syntactic object (SO) {X, Y} corresponding to *hit the ceiling*.

Under IM and EM, *woheni* in (1)b, with the analysis of *he* as a preposition, rewritten as (37), undergoes EM first, merging *he* and *ni* forming a SO *heni* as a PP. Through a separate

<sup>8</sup> However, the examples in (34) and (35) are either informal or non-standard uses in modern Chinese (Jiang 2012). The typical preposition-conjunction word in Mandarin is *he* (Wu 2003).

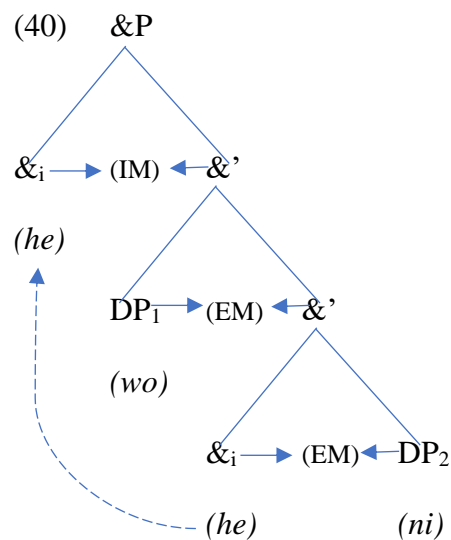
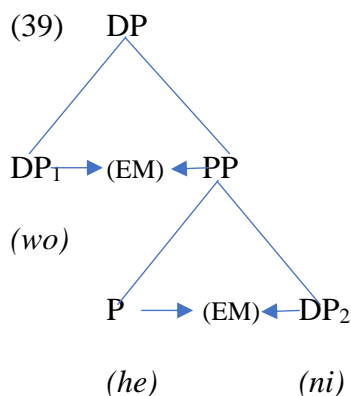
EM, *heni* is then merged with *wo* forming another SO *woheni*, in which *he* is head of *ni* but not of *wo*. The whole merging process does not involve any copying or raising of *he*.

- (37) [wo] [he ni] xin lian xin.  
 I with you heart connect heart  
 ‘I am connected with you.’

A conjunction *he* (and), for example in (1)a, rewritten as (38), is the functional head of a conjunction phrase (&P) undergoes two different types of merge: EM followed by IM. Specifically, in (38), *he* (&<sub>i</sub>) first merges with *ni* through EM, forming &'; then *wo* merges with the complex &', forming another &'. However, the merge of *wo* with the complex &' is intermediate and, therefore, not complete. The reason is, theory-internally, DP<sub>1</sub> is not a head of &P (&<sub>i</sub> is), nor is it a specifier since ‘in a pure Merge theory, the notion of specifier is not definable.’ (Chomsky 2015: 103). Based on the EM, &<sub>i</sub> then copies and raises overtly with the higher &' through IM to form &P (Zoerner 1995).

- (38) [wo he ni] xin lian xin.  
 I and you heart connect heart  
 ‘You and I are connected.’

Therefore, the difference between PP and &P, in terms of MERGE, is that PP is formed through EM, e.g., (39), while &P is yielded first through EM and then IM, e.g., (40).



While in some languages both copies of &<sub>i</sub> are overtly realized (e.g., Yagaria as in (33)b, in other languages, e.g., English and Chinese, only the original copy is transferred to the phonological component  $\Phi$  (Oshima & Kotani 2008: 406-07). This is why, at the surface level, it is *woheni* in (37) and (38) instead of *hewoheni*.

## 5.2 DP<sub>1</sub>-he-DP<sub>2</sub> as a phase and its penetrability

Theoretically, an important aspect about the merging processes in (39) and (40) is their LABELING, which is required for interface interpretation but not virtually detectable in the immediate data available. Although not all features are able to serve as a label, there are motivations  $\&_i$  can (Chomsky 2013). According to the LABELING ALGORITHMS (LAs) in (41) (Chomsky 2008: 145), P is the label for *heni* in (39), which is further labeled as D through EM with *wo* (i.e. SO: {DP<sub>1</sub>, {PP, DP<sub>2</sub>} }}, while  $\&$  is the label for *heni* in (40), which is later labeled again as  $\&$  after its IM with  $\&_i$  (i.e. SO: { $\&_i$ , {DP<sub>1</sub>, { $\&_i$ , DP<sub>2</sub>} } } }).

(41) LABELING ALGORITHMS (LAs)

- a. In {H,  $\alpha$ }, H an LI, H is the label. [LI-lexical item]
- b. If  $\alpha$  is internally merged to  $\beta$ , forming { $\alpha$ ,  $\beta$ }, then the label of  $\beta$  is the label of { $\alpha$ ,  $\beta$ }.

Under labelling, the structural ambiguity no longer necessarily drives from movement. Rather it stems from whether and how labelling has occurred which is a main theoretical advantage (Larson 2014: 32-35).<sup>9</sup>

Correct labeling is important because it defines the edge and interior of a phase of a constituent XP, the construction of which can be followed by lexical access (Chomsky 2000, 2001). In a phase {H, Z}, as a result of MERGE, H is a phase head with complement Z. Then H is the edge, and Z is the interior, of the phase (Chomsky 2013: 42). Recent studies have argued that all major phrases (NP, AP, PP, VP) project phases (e.g., Bošković, 2013: 75), and  $\&P$  is a strong phase (Oshima & Kotani 2008: 421). As a phase, neither PP nor  $\&P$  is ‘penetrable’ as per the PHASE IMPENETRABILITY CONDITION (Chomsky 2000: 108).

(42) PHASE IMPENETRABILITY CONDITION

In phase  $\alpha$  with head H, the domain of H is not accessible to operations outside  $\alpha$ , only H and its edge are accessible to such operations.

The Phase Impenetrability Condition is important in the dual analysis of *he* as both a conjunction and a preposition. Under the impenetrability condition, the interior is subject to no further modification (Chomsky 2013: 42). Therefore, the examples in (7) and (8) are not sufficient to prove *he* is a preposition only. For example, *Mary* in (7)c is the interior that allows no further modification. It cannot be empty. In that case, either analyzed as a PP or as a  $\&P$ , *hemali* (with *Mary* / and *Mary*) in (8)c has *mali* (Mary) as the interior of the phase, which cannot be further modified or deleted. Again, if a resumptive *she* and *ta* (she) are put back in

<sup>9</sup> Larson (2014), in his analysis of Russian comitatives and coordinations, adopted a decomposed Merge account that involves both Concatenation (see Hornstein 2008 for details) and Labelling. Under the decomposed Merge account, a comitative structure does not necessarily undergo labelling, and if so there is a noun that enjoys a structural promotion and is what the verb always agrees with. As Chinese lacks an inflectional morphological agreement in a noun-verb relation, and, therefore, the idea of agreement does not distinguish between comitatives and conjunctions in the Chinese language, we adopt the proposal that PP and  $\&P$  belong to two basic cases of Labelling (Chomsky 2015: 103). Specifically, PP is labeled through ‘criterial freezing’ where the most prominent feature is selected and labeled (also see Rizzi 2010, 2015), and  $\&P$  is labeled through ‘raising’ which is successive-cyclic. This is particularly helpful in the analysis of the iterative conjunctions (see Larson 2014: 37-39), for example (ii):

(ii)    mali    he        aiwen    he        aiwei  
          Mary   and       Ivan       and       Ivy  
          ‘Mary and Ivan and Ivy’

the gaps in (7)c and (8)c - to keep the interior intact<sup>10</sup> - as illustrated in (43) and (44), the corresponding structures are well acceptable.

(43) (As for) Mary, I think *she* and John are studying in two different schools.<sup>11</sup>

(44) Mali,                wo       renwei                yuehan                he        *ta*  
 Mary,                I       think                John                and        she  
 zai       butong                de       xuexiao                xuexi.  
 in       different                DE       school                study  
 ‘As for Mary, I think she and John are studying in two different schools.’

Yang and Hu further argued, based on (9)a-d, that Neither DP<sub>1</sub> nor DP<sub>2</sub> of a true conjunction can be focus marked. Therefore, the acceptability of (10)a and (10)c means *he* can only be a preposition. This is not true, either. Under the Phase Impenetrability Condition, neither PP nor &P can IM to yield a FocP with *only* or *shi/zhi/zhiyou*. The only way to do so is through EM. Examples (9)a-d are unacceptable because, as a &P, the phase is impenetrable, that is, the domain of &<sub>i</sub> is not accessible to operation. Neither *John* nor *Mary*, therefore, can be extracted individually and focus marked (Goodall 2017: 1, 19).

Turning now back to (10)a and (10)c. It is true that both sentences are acceptable only when *he* is read as a preposition. Since both DP<sub>1</sub> and the PP (*he*-DP<sub>2</sub>) are phases themselves, they can each EM with the focus marker *shi/zhi/zhiyou* and form a FocP. However, this does not prove that *he* in (8)a can only be analyzed as a preposition. As a phase, &P *yuehan he mali* can EM with *shi/zhi/zhiyou* and form a FocP, as evidenced in (19). The preposition analysis of *he* adopted in (10)a and (10)c does not exclude the conjunction analysis of *he* in (8)a.

### 5.3 Fallacy of the Secondary Prediction proposal

The SECONDARY PREDICATION construction analysis of *he* as a preposition only is problematic. Hierarchically, there are mechanisms in each language that structured expressions are interpreted at both the interfaces of the SENSORY-MOTOR (SM) system for externalization, and the CONCEPTUAL-INTENTIONAL (CI) system for thought (Chomsky 2013: 35). Therefore, (45)a and (46)a are the forms at the CI interface, while (45)b and (46)b are derived forms of (45)a and (46)a for externalization at the SM interface (see Chomsky 2013: 40, 2015: 99, for further discussion).

- (45) a. We wondered which boys they expected which boys to see each other.  
       b. We wondered which boys they expected to see each other.
- (46) a. What was hit what?  
       b. What was hit?

The SP analysis, if true, should be yielded through IM with copying and raising. Theoretically, DP<sub>2</sub> does not first merge with PRO. Rather it should first EM with *he*, and then the PP EM with

<sup>10</sup> The acceptability of (44) remains the same if *ta* (she) is replaced with *zhe(ge)xiaonühai* (this girl), or *mali* (Mary) itself as long as it is a major category and is related to the topic (Xu & Langendoen 1985).

<sup>11</sup> It is conventional in English that third person pronouns come before proper nouns in coordination structures. Replacing *she and John* with *John and she* makes the sentence less acceptable.

DP<sub>1</sub>. From there, the higher DP<sub>1</sub> is copied and raised from the lower position through IM. This is at the CI interface. At the SM interface, the lower DP<sub>1</sub> is then deleted for externalization. It is the IM, however, that is problematic in the SP analysis. Under the MERGE theory, IM yields information structures that are ‘discourse-related’ (Chomsky 2015: 100). It causes ‘displacement’, which is a form for the CI system (Chomsky 2013: 40). In all the examples from (7) to (10), however, there were no discourse-related motivations for DP<sub>1</sub>’s copying and raising at CI. Therefore, there were no motivations for DP<sub>2</sub> being deleted driven by externalization at SM, since externalization, a ‘fortiori communication’, is an ancillary aspect of language, peripheral to its core nature of thought, and when there is competition between computational efficiency (at CI) and perceptual/communicative efficiency (at SM), ‘universally, computational efficiency prevails’ (Chomsky 2015: 101). As a consequence, the copying and raising of the higher DP<sub>1</sub>, as well as the deletion of the lower DP<sub>1</sub> is not computationally efficient. The SP analysis is problematic at the CI interface, and it does not prove *he* is only a preposition in the subject position.

## 6 Conclusion

This study has reviewed both Zhang’s (2008) and Yang and Hu’s (2018) analysis of *he* in DP<sub>1</sub>-*he*-DP<sub>2</sub> in the subject position in Mandarin Chinese. There is evidence that DP<sub>1</sub> can be modified by *he*-DP<sub>2</sub>-*de* on its left, and the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure is able to undergo verb raising, adverbial insertion, negation, and the A-not-A form. All these, plus the fact that *he*-DP<sub>2</sub> can be topicalized, mean *he* can be analyzed as a preposition, and form with DP<sub>2</sub> a PP.

Under the MERGE theory, PP is derived through EM, while &P is derived through EM and then IM. As a phase, neither PP nor &P is ‘penetrable’ as per the PHASE IMPENETRABILITY CONDITION. Therefore, the interior of a phase is subject to no further modification. DP<sub>1</sub> can be without the PF-based form (however, it is not empty at the LF) in a topic-comment structure in Chinese only because, typologically, Chinese allows for *pro*-drop and is still able to accommodate under the licensing theory (Huang 1984, 1987). However, a silent DP<sub>1</sub> (constrained by the topic) is not preferred (Shi 2000). All the topicalization examples of DP<sub>1</sub>-*he*-DP<sub>2</sub> are well accepted as the interior is kept intact (e.g., by filling the gap with a DP that co-refers the topic). The ungrammaticality of the focus marking examples, however, is because neither PP nor &P can IM and form a FocP. In fact, as a phase, &P has no obstacle to EM with the focus marker and form a FocP. Finally, the SP analysis is problematic under the MERGE theory. There is no discourse-related motivation for DP<sub>1</sub>’s copying and raising at CI, hence, no motivation for DP<sub>2</sub> being deleted driven by externalization at SM. The whole process is not computationally efficient (Chomsky 2015).

While the intention to simplify and to unify the theoretical explanation of *he* is of merit, the price of making no structural distinctions between comitatives and conjunctions is high (Larson 2014). The close affinity between comitatives and conjunctions allows the two to function similarly (p.34). However, lacking singular and plural agreement, it is not easy to distinguish the conjunctive and the comitative use of *he* in the DP<sub>1</sub>-*he*-DP<sub>2</sub> structure in the subject position in Mandarin Chinese. While typologically most languages are either of the AND-type that uses mainly conjunction, or of the WITH-type and mainly uses comitatives (Stassen 2000), Mandarin uses both and the same lexical item is used for both comitatives and conjunctions.

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*Weifeng Han*  
*Federation University of Australia, Melbourne Vic, Australia*  
*w.han@federation.edu.au*

*Dingxu Shi*  
*CLAL, Guangdong University of Foreign Studies, China*  
*dingxu.shi@polyu.edu.hk*

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