

## Mandarin *he*: Conjunction as scalar implicature

**1 Introduction.** Mandarin Chinese is widely assumed to possess a range of conjunctions, such as *he*<sup>1</sup> and *bingqie*, which differ in their syntactic distributions. For example, *he* can coordinate nominal phrases, whereas *bingqie* cannot (1a). In contrast, *bingqie* is able to coordinate clausal elements, while *he* is generally restricted in this regard (1b).

- (1) a. Anna {✓ *he* / ✗ *bingqie*} Sue xiao-le.  
Anna HE BINGQIE Sue smile-PRF  
'Anna and Sue smiled.'
- b. Anna xiao-le, {✗ *he* / ✓ *bingqie*} Sue ye xiao-le.  
Anna smile-PRF HE BINGQIE Sue also smile-PRF  
'Anna smiled, and Sue also smiled.'

This paper challenges the standard view that *he* is a truth-conditionally conjunction. Instead, I argue that *he* is underlyingly disjunctive, with its conjunctive interpretation arising from scalar implicature.

**2 Data.** Although *he* resembles *and* in upward-entailing environments like (1a), it patterns with *or* in downward-entailing (DE) contexts, yielding an *at-least-one* interpretation (2).

- (2) a. Anna mei *he* kafei *he* cha.  
Anna NEG drink coffee HE tea  
'Anna didn't drink coffee or tea.'
- b. Ruguo Anna *he-le* kafei *he* cha, ta kending bu kun le.  
if Anna drink-PRF coffee HE tea 3.SG must NEG sleepy SFP  
'If Anna drank coffee or tea, she must not be sleepy.'

In contrast, *bingqie* does not permit such disjunctive readings in DE environments (3).

- (3) a. Ruguo Anna *he-le* kafei *bingqie* *he-le* cha, ta kending bu kun le.  
if Anna drink-PRF coffee BINGQIE drink-PRF tea 3.SG must NEG sleepy SFP  
'If Anna drank both coffee and tea, she must not be sleepy.'
- b. Mei-ge *he-le* kafei *bingqie* *he-le* cha de xuesheng dou bu kun le.  
every-CL drink-PRF coffee BINGQIE drink-PRF tea DE student DOU NEG sleepy SFP  
'Every student who drank both coffee and tea is no longer sleepy.'

Furthermore, in polar questions, *he* is compatible with an *at-least-one* interpretation, unlike *bingqie*. For example, given a context in which Anna drank only coffee, (5a) constitutes a felicitous answer to (4a), but not to (4b); conversely, (5b) serves as a felicitous response to (4b), but not to (4a).

- (4) a. Anna *he-le* kafei *he* cha ma?  
Anna drink-PRF coffee HE tea SFP  
'Did Anna drink coffee or tea?'
- b. Anna *he-le* kafei *bingqie* *he-le* cha ma?  
Anna drink-PRF coffee BINGQIE drink-PRF tea SFP  
'Did Anna drink both coffee and tea?'
- (5) a. *He-le*. Dan ta zhi *he-le* kafei, mei *he* cha.  
drink-PRF but 3.SG only drink-PRF coffee NEG drink tea  
'Yes, she did. But she drank only coffee but not tea.'
- b. Mei. Ta zhi *he-le* kafei, mei *he* cha.  
NEG 3.SG only drink-PRF coffee NEG drink tea  
'No, she didn't. She drank only coffee but not tea.'

Interestingly, when *he* connects mutually exclusive conjuncts, it still gives rise to a cumulative

<sup>1</sup>While there has been considerable debate over whether *he* in the subject position should be analyzed syntactically as a conjunction or a preposition, I will not engage with this question here.

reading even under the scope of *mei* ‘every’ (6a). This is surprising given that cumulative readings with *every* are only available when *every* is c-commanded by a plural-referring expression, but not vice versa. (Champlion 2010; Zweig 2008, a.o.). In contrast, *bingqie* fails to yield a cumulative reading in the same context (6b).

- (6) a. Mei-ge xuesheng dou lai zi Beijing he Shanghai.  
 every-CL student DOU come from Beijing HE Shanghai  
 ‘Every student comes from (either) Beijing or Shanghai.’  
 b. #Mei-ge xuesheng dou lai zi Beijing bingqie lai zi Shanghai.  
 every-CL student DOU come from Beijing and come from Shanghai  
 ‘#Every student comes from (both) Beijing and Shanghai’

**3 Proposal.** I assume that disjunction functions as an existential quantifier (Rooth and Partee, 1982), as illustrated in (7a) for *huo* in Mandarin. I propose that *he* likewise encodes disjunction, but denotes the closure of the predicate under sum formation (Link, 1983), as shown in (7b). Additionally, *he* triggers obligatory exhaustification over pre-exhaustified alternatives (cf. Spector 2007; Magri 2014), including (i) alternatives derived by substituting *he* with *huo* and (ii) partial conjuncts coordinated by *he*.

- (7) a.  $\llbracket a \text{ huo } b \rrbracket = \lambda P. \exists x \in \{a, b\}. P(x)$   
 b.  $\llbracket a \text{ he } b \rrbracket = \lambda P. \exists x \in \{a, b, a \oplus b\}. P(x)$

Consider (8a) as a toy example. Here, *he* obligatorily activates a set of pre-exhaustified alternatives, as illustrated in (8b). These in turn trigger their own alternatives (omitted here for brevity).  $\text{ExH}$  asserts the prejacent and negates all stronger alternatives (8c). The resulting interpretation in (8d) states that at least one among Anna, Betty, Sue, and their sums smiled, but it is not the case that only one or any two of them smiled—hence, all three must have smiled.

- (8) a. LF:  $\text{ExH}[\text{Anna, Betty, he Sue smiled}]$   
 b.  $C: \{\text{ExH}[\text{Anna, Betty, huo Sue smiled}], \text{ExH}[\text{Anna he Betty smiled}], \text{ExH}[\text{Anna he Sue smiled}], \text{ExH}[\text{Betty he Sue smiled}]\}$   
 c.  $\llbracket \text{ExH } \phi \rrbracket = 1$  iff  $\llbracket \phi \rrbracket = 1 \wedge \forall q \in C [\phi \not\Rightarrow q \rightarrow \neg q]$   
 d.  $\llbracket 8a \rrbracket = \exists x \in \{A, B, S, A \oplus B, A \oplus S, B \oplus S, A \oplus B \oplus S\}. x \text{ smiled}$   
 $\wedge \neg \text{ExH}[\exists x \in \{A, B, S\}. x \text{ smiled}] \wedge \neg \text{ExH}[\text{ExH}[\exists x \in \{A, B, A \oplus B\}. x \text{ smiled}]]$   
 $\wedge \neg \text{ExH}[\text{ExH}[\exists x \in \{A, S, A \oplus S\}. x \text{ smiled}]] \wedge \neg \text{ExH}[\text{ExH}[\exists x \in \{B, S, B \oplus S\}. x \text{ smiled}]] = \exists x \in \{A \oplus B \oplus S\}. x \text{ smiled}$

This analysis also predicts sentences with non-distributive predicates yield both collective and distributive readings (cf. Liu 2017), as exemplified in (9).

- (9) a. LF:  $\text{ExH}[\text{Anna he Sue bought a car}]$   
 b.  $C: \{\text{ExH}[\text{Anna huo Sue bought a car}]\}$   
 c.  $\llbracket \text{ExH}[\text{Anna huo Sue bought a car}] \rrbracket$   
 $= \exists x \in \{A, S\}. \text{bought-a-car}(x) \wedge \neg \forall x \in \{A, S\}. \text{bought-a-car}(x)$   
 d.  $\llbracket 9a \rrbracket = \exists x \in \{A, S, A \oplus S\}. \text{bought-a-car}(x) \wedge$   
 $\neg [\exists x \in \{A, S\}. \text{bought-a-car}(x) \wedge \neg \forall x \in \{A, S\}. \text{bought-a-car}(x)]$   
 $= \exists x \in \{A \oplus S\}. \text{bought-a-car}(x) \vee \forall x \in \{A, S\}. \text{bought-a-car}(x)$

DE contexts are well known to block scalar implicatures. Consequently, *he* is not strengthened in such contexts and simply conveys its basic meaning. Furthermore, when the conjuncts are mutually exclusive, sum formation is ruled out due to contextual constraints. In these environments, *he* converges semantically with *huo*, as predicted under an alternative pruning mechanism.

**4 Conclusion.** This paper presents novel evidence that Mandarin *he* exhibits semantic behavior distinct from conjunctions like *bingqie*. I argue that *he* is underlyingly disjunctive, denoting predicate closure under sum formation and triggering scalar implicatures. This analysis situates *he* within broader cross-linguistic research on plurality, homogeneity, and cumulativity.

## References.

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