Exclusive (Dis)harmonies in Mandarin Chinese

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Abstract
The paper discusses two types of exclusive (dis)harmonies in Mandarin. Exclusive-(dis)harmony-A—only is compatible with few but not many, and exclusive-(dis)harmony-B—only is compatible with less than n but not more than n. We suggest Exclusive-(dis)harmony-A can be explained along the lines of Chen 2005. We further propose that Exclusive-disharmony-B can be explained by Maximization failure (Fox 2007). But Maximization failure rules out Exclusive-harmony-B as well. We then propose to use a scalar presupposition of jiu/zhi/only to restrict the standard Rooth-style focus alternative set. This presupposition achieves two things: it captures the scalar meaning of only, and it allows maximization to work with less than n, by filtering out problematic alternatives.

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1 *Dou (Dis)Harmony*

Chen (2005) observes that the distributive operator *dou* (Lin 1998) in Mandarin is compatible with quantifiers describing large quantities such as *henduo* ‘many’ (1a), but not with small-quantity quantifiers such as *henshao* ‘few’ (1b).

(1) *Dou-(dis)harmony*

| a. | Zuotian juhui, henduo ren  dou  lai  le.  
|   | yesterday party, many people DOU come ASP  
|   | ‘Yesterday, many people came to the party.’ |
| b. | *Zuotian juhui, henshao ren  dou  lai  le.  
|   | yesterday party, few people DOU come ASP  
|   | Intended: ‘Yesterday, few people came to the party.’ |

Chen names this phenomenon *dou-(dis)harmony* and offers an explanation based on a context-dependent expected value $s_c$. Specifically, *dou* carries a presupposition that the number of ‘NPs’ (*people in (1))* that ‘VP’ (*came to the party in (1))* falls above the expected value $s_c$.

Since ‘few NP VP’ is true iff the number of ‘NPs’ that ‘VP’ falls below $s_c$ (Partee 1988), contradicting the high-rank presupposition of *dou*, *dou* is incompatible with *few*.

In a parallel manner, the compatibility of *dou* and *many* is explained by taking ‘*many NP VP*’ to be true iff the number of ‘NPs’ that ‘VP’ falls above $s_c$.

2 *Exclusive (Dis)Harmonies*

2.1 *Exclusive (Dis)Harmony-A*

Mandarin exclusive particles (*jiu, zhi(you) ‘only’*) exhibit the opposite pattern from *dou* (already mentioned in Chen (2005)). Specifically, they are compatible with quantifiers denoting small quantities such as *few* (2a) but not with those denoting large quantities such as *many* (2b). We call this *exclusive (dis)harmony-A*.

(2) *Exclusive-(dis)harmony-A*

|   | yesterday party, only/only few people come  
|   | ‘Yesterday, only few people came to the party.’ |
| b. | *Zuotian juhui, jiu/zhi henduo ren  lai.  
|   | yesterday party, only/only many people come  
|   | Intended: ‘*Yesterday, only many people came to the party.’ |

An analysis based on Chen (2005) is conceivable for exclusive (dis)harmony-A. All we have to assume is that Chinese exclusives carry a low-rank presupposition that its ‘NP’:associate that ‘VP’ falls below the expected value $s_c$. This is actually the *mirative particle* analysis of English *only* in Zeevat (2009), where the core meaning of *only* is ‘less than expected’.

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2.2 Exclusive (Dis)Harmony-B

We further discover Exclusive (dis)harmony-B: Mandarin exclusives are compatible with modified numeral *budao n “less-than n” (3a), but not with *chaoguo n “more-than n” (3b).

(3) **Exclusive-(dis)harmony-B**

a. *jiu/zhi(you) budao shi ge ren lai.*
   only/only less-than 10 CL people come
   Only less than 10 people came to the party.
b. *“jiu/zhi(you) chaoguo shi ge ren lai.***
   *only/only more-than 10 CL people come*
   Intended: ‘*Only more than 10\textsubscript{F} people came to the party.’

Exclusive (dis)harmony-B cannot be explained by Chen (2005)’s analysis which crucially relies on the expected value \(s_c\). This is because the standard semantics (Hackl 2000, Nouwen 2010) of modified numerals such as less/less-than \(n\) does not involve a context-dependent \(s_c\).

(4) \[\text{more than 10} = \lambda D.\max(D) > 10 \]
\[\text{less than 10} = \lambda D.\max(D) < 10 \quad \text{(cf. Nouwen 2010, (13))}\]

Compare (4) with a recent proposal for many/few in Solt (2014): \(s_c\) is encoded in the latter but not in the former, and thus Chen’s analysis cannot be extended to (3).

(5) \[\text{many} = \lambda D.\max(D) > s_c \]
\[\text{few} = \lambda D.\max(D) < s_c \quad \text{(cf. Solt 2014, (9))}\]

3 Towards an Explanation

3.1 Universal Density of Measurement and Maximization Failure

Based on their Universal Density of Measurement (UDM), Fox and Hackl (2006) provide an analysis for only’s incompatibility with more than \(n\) (cf. (3b)), which we adopt to explain half of our Exclusive (dis)harmony-B puzzle.

(6) **The UDM**
Measurement scales needed for natural language semantics are always dense.

(7) **Density**
A scale \(S\) is dense iff for any two degrees \(d_1\) and \(d_2\) on \(S\), there is a degree \(d_3\) between \(d_1\) and \(d_2\): \(\forall d_1, \forall d_2 ((d_1 < d_2) \rightarrow \exists d_3 (d_1 < d_3 < d_2))\)

Specifically, we take the standard semantics of only (Horn 1969, Schwarzschild 1994), as in (8):\(^1\) with UDM, we will run into contradiction when we combine only with more than \(n_F\), and contradiction like this gives rise to ill-formedness (Gajewski 2002).

(8) **Semantics of only**

\(\text{only}_C(p)\) presupposes \(p(w) = 1^2\)  
Prejacent presupposition
if defined, it asserts \(\lambda w \forall q \in C[q(w) \rightarrow p \subseteq q]\)  
Exclusive assertion

(9) **Fox and Hackl’s reasoning**: *only more than 10\textsubscript{F} people came = (3b)*
a. (3b) presupposes \(p\): more than 10 people came

\(^1\)\(C\) in (8) is the quantificational domain of only and it is restricted by focus: focus on an expression \(a\) triggers alternatives which share with \(a\) the same semantic type (Rooth 1985). \(C\) is required to be a subset of the set of propositions obtained by replacing the focus part of the prejacent with its alternatives (Rooth 1992).

\(^2\)Neither Fox & Hackl’s reasoning nor my reformulation needs to assume that the prejacent is presupposed. The reasoning goes through as long as the prejacent is entailed, that is, it could be asserted instead.
b. (3b) asserts \( q \): it’s not the case that more than \( n \) people came, with \( n > 10 \);
c. \( p \) entails \( r \): there were 10 +\( \varepsilon \) people coming;
d. because of UDM and \( r \): more than 10 +\( \varepsilon /2 \) people came;
e. but according to \( q \) and the fact that 10+\( \varepsilon /2 \) > 10: it’s not the case that more than 10 +\( \varepsilon /2 \) people came;
f. contradiction.

There is a simpler way of looking at the above reasoning (cf. Chierchia 2013 on NPI): first, it is a fact that for any \( n > 10 \), more than \( n \) people came entails more than 10 people came; next, because of only, it’s not the case that more than \( n \) people came, for any \( n > 10 \); but negating all these stronger alternatives means that exactly 10 people came, which contradicts the prejacent.

There is also a more general way of looking at this, which sees (3b) as an instance of maximization failure (Fox 2007, cf. the negative island literature).

Roughly, maximization failure happens when a maximization operator (only in our case) fails to pick out the correct greatest element (the prejacent of only in our case when applied to a (algebraic) set). Consider (3b). Only says that its prejacent is the strongest true proposition (=all non-weaker alternative propositions are false), but this requirement cannot be satisfied: supposing that 14 people came (based on what the prejacent in (3b) means), the set of true alternative propositions is \{ . . . more than 9 people came ⊃ more than 10 people came ⊃ more than 11 people came . . . \}. Because of density, this set (interval) is not right bounded, thus no greatest element exists and maximization fails. Since 14 is arbitrarily chosen, maximization always fails and using only is infelicitous.

3.2 Problem With Less than \( n \)

Exclusive-(dis)harmony-B as in (3) has two parts, the harmony part (3a) and the disharmony part (3b). We have looked at how Fox and Hackl (2006) and Fox (2007) explain the disharmony part, but what about the harmony part?

It turns out that they predict exclusives are equally bad with less than \( n \), thus failing to explain their compatibility in Mandarin, illustrated again in (10).

(10) **Exclusive-harmony-B**

\[ jiu/zhi(you) budao shi ge ren lai. \]

Only/only less-than 10 CT people come

Only less than 10 people came to the party.

The reasoning sketched in (11) is exactly parallel to the case of more than \( n \).

(11) **An incorrect prediction**

a. only in (10) says that less than 10 people came is the strongest proposition;
b. (10) also presupposes that less than 10 people came; let’s say actually 8 people came.
c. now the set of true alternative propositions is \{ . . . less than 9 people came ⊂ less than 10 people came ⊂ less than 11 people came . . . \}
d. Because of density, this set (interval) is not left bounded; thus no greatest element.

e. since 8 is arbitrarily chosen, maximization always fails.
f. (10) is incorrectly predicted to be bad.

The rest of the paper is devoted to tackling this problem. Here is a preview of how we are going to do it: we will propose that only/jiu/zhi(you) can restrict an alternative set (interval) \( C = \{ . . . less \)
than 9 people came ⊂ less than 10 people came ⊂ less than 11 people came . . . \} into a Restricted alternative set \( C' = \{ less \) than 10 people came ⊂ less than 11 people came . . . \}. The new set (interval) has a strongest element, i.e., the prejacent; thus no maximization failure.

Before we explain why exclusives can do this with less than \( n \) but not with more than \( n \), let’s look at the scalar/evaluative component of only/jiu/zhi(you). It turns out that the restricting function of exclusives mentioned above are independently needed for analyzing their scalarity.

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3Following Horn 1996, we call the only-less part of an only-sentence the prejacent of only.

4Underlining singles out the prejacent.
3.3 Only’s Scalar Presupposition


(12) The scalar inference of only
   a. 10 people came, which were a lot.
   b. #Only 10 people came, which were a lot.

(13) The scalar inference of jiu/zhi
   a. you shi ge ren lai, zhen duo!
      HAVE ten CL people come, really many
      ‘10 people came, which were a lot.’
   b. #jiu/zhi only/only you shi ge ren lai, zhen duo!
      only/only HAVE ten CL people come, really many
      Intended: #only 10 people came, which were a lot.

Sentences (12a) and (13a) are good because 10 people can either be many or few, depending on the context. But (12b) and (13b) sound contradictory because the only/jiu/zhi(you) carry a scalar meaning that the people that came were few, which contradicts the content of the following relative clause.

To formally represent the scalar reading, we propose to assign only/jiu/zhi(you) a presupposition that requires the focus associated with only/jiu/zhi(you) to be ranked lower on a scale $R$ than its any other alternatives. Formally, this is represented in (14).

(14) Scalar Presupposition of only/jiu/zhi(you)
    $\forall x \in C \mid x \neq [\text{focus}] \rightarrow [\text{focus}] < R x$

(15) Scalar Presupposition of even
    $\forall q \in C \mid q \neq [\text{prejacent}] \rightarrow [\text{prejacent}] < \text{likely} q$

Sentence (14) follows a common way of capturing the scalar presuppositions of scalar FPs like even (Karttunen and Peters 1979) and already/still (Krifka 2000). Take even as an instance. The only difference between (14) and (15) is that the former ranks individuals while the latter propositions. By ranking the prejacent of even as the bottom of a likelihood scale we obtain the inference that the prejacent is the least likely. Similarly, by ranking 10 as the bottom of the number scale, we obtain the inference that 10 is a small number. The contrast shown in (12) and (13) is thus captured.

3.4 Restricted Alt

To capture the scalar component of only, we virtually restrict the Rooth-style alternative set triggered by focus to an (ordered) subset $C'$ of which the focus value is the bottom. Restricted Alt is the key to the above-mentioned exclusive-harmony-B puzzle.

5Krifka 2000 is interested in German schon/noch ‘already/still’, which contribute early/late scalar inferences. Krifka’s way of capturing these scalar inferences is exactly like our (14). For example, schon is truth-conditionally vacuous but presupposes that its associate is ranked earlier than all the other alternatives.

6We are here actually using a superlative semantics to capture an evaluative intuition, which is not quite right. To witness, that John is lower than any of its alternatives on an effort scale does not mean getting hold of John is easy (perhaps all of them are difficult to get hold of), just as John is the tallest does not mean John is tall. To fix this, we posit a requirement (i) which says that the context dependent expected value $s_c$ (Kennedy 1999) should always be included in the restricted alternative set induced by jiu. Intuitively, this is plausible, since the restricted alternative set tries to capture the idea of alternatives under consideration (Krifka 2000), and the expected value seems to always qualify as one of them.

(i) Expected value is always under consideration
    $\exists x \in C \mid x \neq [\alpha] \land \mu_R(x) = s_c$
Consider *jiu/zhi* with *less than n* in (16).

(16) *jiu/zhi* less than 10_F people came.

Restricted Alt: \(10 < 11 < 12 \ldots\)

C: \{less than 10 people came \(\subset\) less than 11 people came, \ldots\}

Maximization applies successfully; the prejacent is the strongest proposition.

In (16), the presupposition of *jiu/zhi* in (14) restricts the alternative set of 10_F into \{10, 11, 12, \ldots\}. Because *less than 10 people came* entails *less than n people came* for every \(n \geq 10\), the prejacent can never be the strongest proposition due to density. As a result, *jiu/zhi*’s requirement is not satisfied and exclusive disharmony B follows.

3.5 Trivialization

The essence of our story is that we allow the exclusive component of *jiu/zhi* to be trivialized/vacuous.

(18) *jiu/zhi* less than 10_F people came.

Restricted Alt: \(10 < 11 < 12 \ldots\)

C: \{less than 10 people came \(\subset\) less than 11 people came, \ldots\}

Exclusive Assertion in (8) applies vacuously.

This is correct, since *jiu* and *zhi*, when associated with *less than n_F*, are indeed nonexclusive. Consider the following dialogue.

(19) A: *Zuotian Yuehan jiu/zhi chi le budao [san]_F ge pingguo?*

\[\text{yesterday John only/only eat \(LE\) less-than 3 \(CL\) apple}\]

‘Yesterday, did John eat only less than 3 apples?’

B: Dui. qishi tian liang ge dou budao.

\[\text{Right. actually even 2 \(CL\) even less-than}\]

‘Yes, actually he ate even less than 2.’

In (19), B uses *da* ‘right’ to affirm the proposition \(p\) that *John only ate less than 3 apples* but then he adds a proposition \(q\) that *John ate less than 2 apples*; this is impossible if the *only* in \(p\) were exclusive: being exclusive, it would negate \(q\) according to the standard semantics of *only* (8), for \(q\) asymmetrically entails the prejacent of \(p\) that *John ate less than 3 apples*.

Sentence (19) contrasts with (20), where the *jiu/zhi* is exclusive, and thus leads to a contradiction.

(20) A: *Zuotian Yuehan jiu/zhi chi le [san]_F ge pingguo?*

\[\text{yesterday John only/only eat \(LE\) 3 \(CL\) apple}\]

‘Yesterday, did John eat only 3 apples?’

B: # Dui. qishi ta chi le si ge.

\[\text{# Yes, actually he ate 4.}\]

The contrast between (19) and (20) is a consequence of our proposal. While the exclusive component of *jiu/zhi* is trivialized (by their scalar presupposition) in the case of *less than n_F* as in (18), it stays intact in the case of bare numerals, as is illustrated in (21).
Not everyone agrees that the assertion of only-like exclusives can be trivialized (see for example, Beaver and Clark 2008, Alxatib 2013). They would have a non-vacuity condition built into the lexical entry of only, for example: the prejacent of only (or its negation) cannot entail all of its alternatives.

They base their non-vacuity claim on cases like *He only saw [every student]: because he saw every student entails all the other alternatives (or its negation), non-vacuity is violated, and thus the sentence is bad.

But scalar presupposition as in (14) can also explain this: every student just cannot be the bottom of any alternative set.

Furthermore, it needs to be mentioned that trivialization of a covert only is essential in Chierchia (2013) to explain the distribution of weak NPIs like any (on its NPI use). Roughly, any triggers alternatives and needs a covert only to ‘exhaustify’/‘tame’ them. In positive contexts, the covert only gives rise to contradiction, and thus any is not licensed; on the other hand, in negative contexts, the covert only is trivialized, and thus there is no contradiction or ill-formedness for any.

Finally, English only is not very comfortable with less than n. We might take this fact to suggest that English only (not the covert one) does not allow its exclusive component to be trivialized. For instance, (22) and (23) are both bad, but for different reasons. This might explain why people tend to feel a difference between (22) and (23).

(22) *Only more than 10F people came. Contradiction
(23) ??Only less than 10F people came. Trivialization

But crucially, Mandarin jiù/zhi are fully compatible with less than n, suggesting they do not have a non-vacuity condition built into their semantics.

4 Conclusion

We have discussed two types of exclusive (dis)harmonies in Mandarin. Exclusive-(dis)harmony-A—only is compatible with few but not many, and exclusive-(dis)harmony-B—only is compatible with less than n but not more than n.

We suggest Exclusive-(dis)harmony-A can be explained along the lines of Chen 2005.

We further propose that Exclusive-disharmony-B can be explained by Maximization failure (Fox 2007). But Maximization failure rules out Exclusive-harmony-B as well. We then propose to use a scalar presupposition of jiù/zhi/only to restrict the standard Rooth-style focus alternative set. This presupposition achieves two things: it captures the scalar meaning of only, and it allows maximization to work with less than n, by filtering out problematic alternatives.

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Judgements come from several native speakers I consulted and an anonymous PLC reviewer.


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