How to reconcile maximal and non-maximal ‘every’

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Form-meaning mismatches

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The co-occurrence puzzle

Mandarin *mei* is traditionally translated as ‘every’. But the universal quantifier (UQ) nature of *mei* has long been contested (since Lin 1998) because ***mei*-subjects** are canonically licensed by *dou*.

(1) yuehan xihuan mei-(yi)-ge haizi
John like MEI-one-CLF kids
‘John likes every kid (without any exception).’

(2) mei-(yi)-ge haizi *(**dou**) xiao le
MEI-one-CLF kid DOU smile PRF
‘Every kid smiled.’

Two possible analyses

Previous approaches differ in technical details but share the common core idea: they strip away either *mei*’s or *dou*’s UQ force.

A. *mei* ≈ English ‘the’ and contributes a $\bigoplus$, *dou* is UQ (since Lin 1998)
B. *mei* is UQ, *dou* is truth-conditionally vacuous and contributes a presuppositional meaning (Liu 2021).

One way to pinpoint the source of UQ force: the appearance/disappearance of *homogeneity* and *non-maximality*.

Homogeneity, non-maximality and their removal

Plural definite descriptions (PDs) cross-linguistically are known to exhibit homogeneity: in positive contexts, their preferred interpretation is **quasi-universal**; but in negative contexts, they tend to receive only the existential interpretation.

(3) **Homogeneity**
a. The kids smiled. ≈ All of the kids smiled.
b. The kids did not smile. ≈ None of the kids smiled.

The interpretation of PDs is only quasi-universal: non-maximal readings in certain contexts (Križ 2015, a.o.).

(4) **Non-maximality**
a. *Context: John hired a costumed character for his son’s birthday party. Someone asked whether the kids are entertained. John saw that 7 out of 10 kids smiled, so he replied:*
b. The kids smiled.

Universal quantifiers (UQs) like *every/all* can remove both.

(5) **Removal**
a. All the kids smiled. ⇝ The kids all smiled with no exception.
b. All the kids did not smile. ⇝ Not all of the kids smiled.

dou blocks homogeneity and non-maximality

Mandarin bare nouns (which can have a definite plural interpretation) give rise to the homogeneity. (6a) can have a non-maximal interpretation in the context in (4).

(6) haizi-men xiao-le.
kid-PL smile-PRF
‘The kids smiled.’ ≈ All/Almost all kids smiled.

(7) a. haizi-men xiao-le ma?
kid-PL smile-PRF SFP
‘Did the kids smile?’

b. mei-you.
NEG-PRF
‘No.’ ≈ No/nearly no kid smile.

The insertion of *dou* removes both.

(8) haizi-men dou xiao-le.
kid-PL DOU smile-PRF
‘The kids all smiled.’

(9) a. haizi-men dou xiao-le ma?
kid-PL DOU smile-PRF SFP
‘Did the kids all smile?’

b. mei-you.
NEG-PRF
‘No.’ ≈ Not all the kids smile.

It seems *dou* has UQ force, which favors the *analysis A*.

mei without dou

Since *mei* is canonically accompanied by *dou*, how to test the power of *mei*?

The testing ground is provided by the exceptional case: with the presence of a NumP object in the VP, *dou*’s presence becomes optional (Huang 1996, Sun 2017).

(10) ***Scenario:*** *The teacher is giving instructions to the 4 kids a,b,c,d in an art class:*
a. **mei-liang-ge** haizi hua yi-fu-hua!
MEI-TWO-CLF kid draw one-CLF-picture
‘Groups of 2 kids draw 1 picture!’
b. **mei-liang-ge** haizi **dou** hua yi-fu-hua!
MEI-TWO-CLF kid DOU draw one-CLF-picture
‘Every conceivable pair of kids, draw 1 picture!’

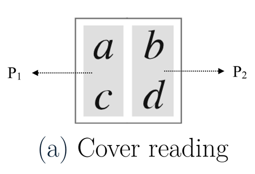
(10a) would be made true iff any of the three possibilities is true:

(11) a. a and b as a group drew a picture, c and d a group drew a picture;
b. a and c as a group drew a picture, b and d a group drew a picture;
c. a and d as a group drew a picture, c and b a group drew a picture;

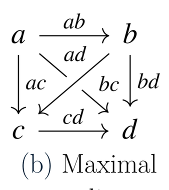
(10b) would be true iff all 6 possible groups of 2 kids, i.e. ab, cd, ac, bd, ad, cb each drew 1 picture.

NB: Coverage ≠ Maximality

- *mei* ensures a weaker ‘cover’ reading where every kid belongs to a group of 2 kids that draw 1 picture.
- *mei* and *dou* gives us the truly ‘maximal’ reading: every conceivable pair of kids should draw 1 picture.



(a) Cover reading



(b) Maximal reading

In this sense, the ‘cover’ reading can be understood as a **non-maximal** reading in the sense that

(12) $\{\{a,c\},\{b,d\}\} \subseteq \{\{a,b\},\{c,d\},\{a,c\},\{b,d\},\{a,d\},\{c,b\}\}$

dou, not *mei*, removes homogeneity

If *mei* only ensures ‘coverage’ but not maximality, then homogeneity should survive. This is indeed the case.

(13) a. **mei-liang-ge** haizi hua-le yi-fu-hua ma?
MEI-TWO-CLF kid draw-PRF one-CLF-picture SFP
‘Is it the case that groups of 2 kids draw 1 picture?’

b. mei-you.
NEG-PRF
‘No. (Each group drew 2.)’
≈ No groups of 2 kids drew 1 picture.

In contrast, *dou* removes both homogeneity and non-maximality.

(14) a. **mei-liang-ge** haizi **dou** hua yi-fu-hua ma?
MEI-TWO-CLF kid DOU draw one-CLF-picture SFP
‘Is it the case that every conceivable pair of kids drew 1 picture?’

b. mei-you.
NEG-PRF
‘No. (Ann and Bea left early to have ice cream.)’
≈ Not all groups of 2 kids drew 1 picture.

Analysis: Covert Group formation

NB: Lin (1998)’s analysis of *mei* ≈ *the* is problematic:

(15) **The** two kids drew a picture $\not\approx$ Pluralities/Groups consisting of two kids (each) drew a picture.

I assume that *mei* can select a GROUP-denoting NP. The function Δ can build a set of groups given a set, via GENERATION and MEMBERSHIP defined based on $\uparrow$ and $\downarrow$ (à la Landman 1989).

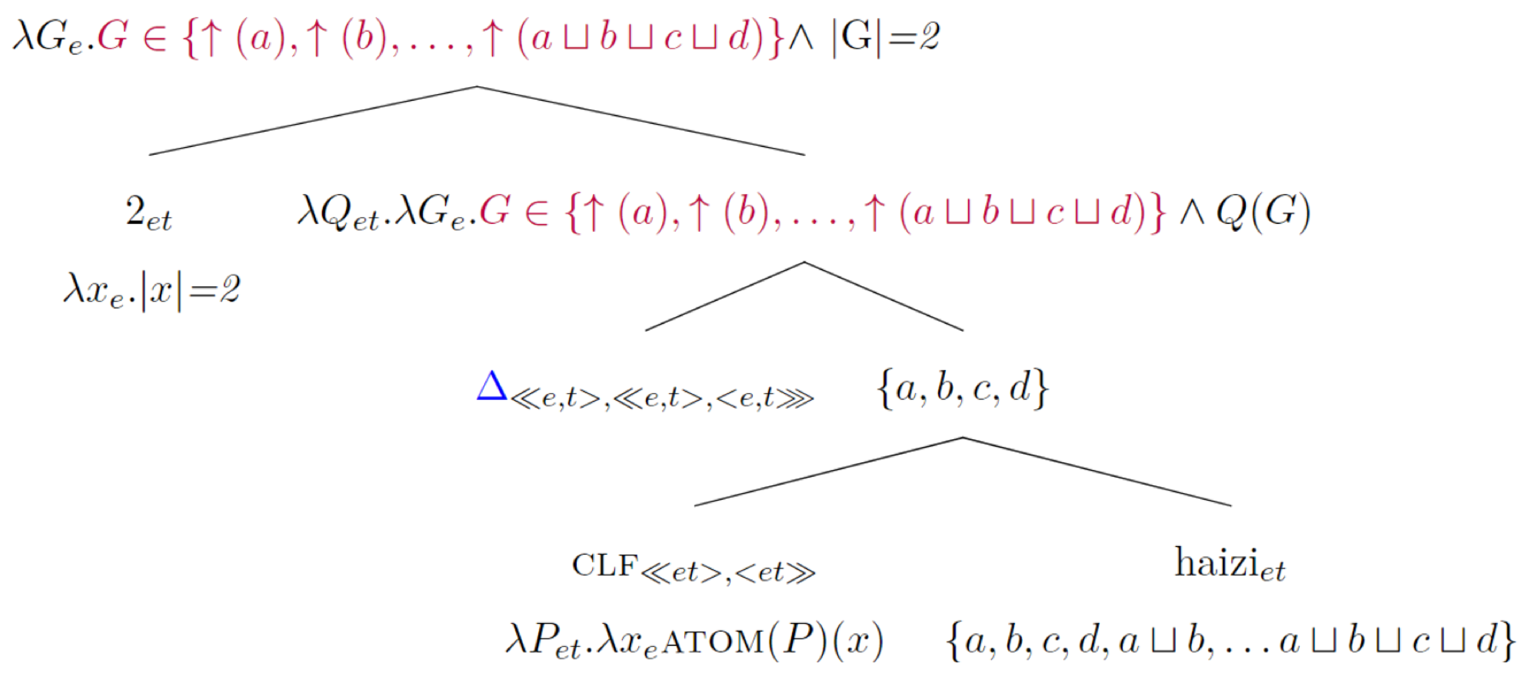
(16) a. $\text{ATOM} = \text{IND} \cup \text{GROUP}$
b. For any singular predicate P, $*P(x)$ iff $\exists A \subseteq D_e.\ x = \sqcup(A) \wedge \forall y[y \in A \rightarrow P(y)]$ (Link 1983)
c. $\uparrow$: $^*\text{IND} \rightarrow \text{ATOM}$ such that
(i) $\forall a \in (^*\text{IND} - \text{ATOM}), \uparrow(a) \in \text{GROUP}$
(ii) $\forall b \in \text{IND}, \uparrow(b) = b$
(iii) if $a \neq b$, then $\uparrow(a) \neq \uparrow(b)$
d. $\downarrow$: $\text{ATOM} \rightarrow {}^*\text{IND}$ such that
(i) $\forall a \in {}^*\text{IND}, \downarrow(\uparrow(a)) = a$
(ii) $\forall b \in \text{IND}, \downarrow(b) = b$

(17) **Generation**: The set of groups $\mathbb{G}$ is generated from set A via $\uparrow$, written as $\mathbb{G}_{\{A,\uparrow\}}$ iff $\mathbb{G}_{\{A,\uparrow\}} = \{G \in D_e$: for some $X \in *A : G = \uparrow(X)\}$ (The set of groups from sums of A-elements)

(18) **Group membership**: For any $a \in \text{IND}$ and any $G \in \text{GROUP}$ such that $G = \uparrow(b)$ and $b \in *\text{IND}$, a is a member of G iff $a \sqsubseteq \downarrow(\uparrow(b))$ ($\sqsubseteq$ stands for the ‘part-of’ relation on D_e).

(19) $[\![\Delta]\!] = \lambda P_{et}.\lambda Q_{et}.\lambda G_e.G \in \mathbb{G}_{\{P,\uparrow\}} \wedge Q(G)$

I assume that singular sortal classifiers denote the atomizing function that restrict the domain of bare nouns (Nomoto 2013). Numerals characterizes the set of pluralities X whose cardinality is n.



mei vs. *mei dou*

(20) $[\![2\ \text{CLF haizi}]\!] = \{\uparrow(a \sqcup b), \uparrow(a \sqcup c), \uparrow(a \sqcup d), \uparrow(b \sqcup c), \uparrow(b \sqcup d), \uparrow(c \sqcup d)\}$

Following Bar-Lev (2021), I assume that non-maximality originates from existential quantification over the set offered by the *mei*-phrase. I assume that *mei* picks out a set of subsets of the group NP extension in (20), which are of contextually ***permissible*** ($\simeq$).

(21) a. $\forall \mathbb{G}, \mathbb{G}' \in D_{et}.\mathbb{G} \simeq \mathbb{G}'$, i.e. $\mathbb{G}$ is contextually *permissible* from $\mathbb{G}'$, iff the sum of members of all $G \in \mathbb{G}$ and all $G' \in \mathbb{G}'$ are the same.
b. $\{\uparrow(a \sqcup b), \uparrow(c \sqcup d)\} \simeq \{\uparrow(a \sqcup b), \uparrow(a \sqcup c), \uparrow(a \sqcup d), \uparrow(b \sqcup c), \uparrow(b \sqcup d), \uparrow(c \sqcup d)\}$

(22) a. $[\![mei]\!]^c = [\![\text{DEF}]\!]^{\simeq} = \lambda \mathbb{G}_{et}.\{\mathbb{G}' | \mathbb{G} \simeq \mathbb{G}$ in context c$\}$
b. $[\![mei\ 2\ \text{CLF haizi}]\!]^c = \left\{ \begin{array}{c} \{\uparrow(a \sqcup b), \uparrow(c \sqcup d)\}, \\ \{\uparrow(a \sqcup c), \uparrow(b \sqcup d)\}, \\ \ldots \\ \{\uparrow(a \sqcup b), \uparrow(a \sqcup c), \uparrow(a \sqcup d), \uparrow(b \sqcup c), \uparrow(b \sqcup d), \uparrow(c \sqcup d)\} \end{array} \right\}$

(23) a. LF of (10a): [[mei 2 CLF kid] [$\text{DIST}_\exists$ [drew 1 picture]]]
b. $[\![(23a)]\!]$=1 iff **drew 1 picture**$(\{\uparrow(a \sqcup b), \uparrow(c \sqcup d)\}) \vee$ **drew 1 picture**$(\{\uparrow(a \sqcup b), \uparrow(c \sqcup d)\}) \vee \ldots$

(24) a. LF of (10b) with *dou*: [[mei 2 CLF kid] [$\text{DIST}_\forall$ [drew 1 picture]]]
b. $[\![(24a)]\!]$=1 iff **drew 1 picture**$(\{\uparrow(a \sqcup b), \uparrow(c \sqcup d)\}) \wedge$ **drew 1 picture**$(\{\uparrow(a \sqcup b), \uparrow(c \sqcup d)\}) \wedge \ldots$

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