The Function of měi in měi-NPs

Zanhui Huang and Yan Jiang

Hong Kong Polytechnic University

This paper analyses the function of měi. Assuming the distributive property as an absolute property of being sensitive to singularities (or atoms), we propose that měi is really a distributive operator by observing the structure of the quantification domain of měi + yī/num + CL. Being a distributive operator, měi always selects atoms as its argument. However, when followed by a num-CL sequence, the atomic structure shows indeterminacy with respect to the atoms contained. It is such an indeterminacy property that determinates the anti-episodicity of měi + num + CL sentences, and excludes the occurrence of dōu, which is the iota operator and can only be defined on a set with stable elements.

1. Introduction

Měi has been hotly discussed in recent research on Chinese quantification and nominal expressions (Lin 1998, Huang 2005, Pan et al. 2005, Yuan 2007, Cheng 2009, etc.). From the previous discussions we can see that whether měi is a distributive operator or not is the most debatable issue. In this paper, based on some newly-discovered data, we wish to argue that měi is to be better described as a distributive operator.

The data mainly concern the change of the number which occurs in měi nominal constructions. Aside from the fact that měi occurs with yī (‘one’) + CL + NP, which is the most usual distribution of měi and is more familiar to us, měi can also occur with

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numbers larger than $yi$. What is interesting is that when the number following $mei$ is larger than one, the distribution of the $mei + num + CL + NP$ construction\(^1\) is highly restricted compared with $mei + yi + CL + NP$. This is illustrated by the following examples.

**Group 1:** distributive predicates can be predicated on $mei + yi + CL + NP$ constructions, but not on $mei + num + CL + NP$ constructions.

(1) $mei \ yi (/*liăng)-gè xuéshēng dōu biyè-le.$

\begin{tabular}{l}
\text{MEI one (/two)-CL student DOU graduate-SFP} \\
\text{‘Every student graduated.’} \\
\text{‘*Every two students graduated.’}
\end{tabular}$

**Group 2:** $dōu$ occurs well with $mei + yi + CL + NP$ constructions, but not with $mei + num + CL + NP$ constructions.\(^2\)

(2) $mei \ yi (/*liăng)-gè xuéshēng dōu chǐ $yi-kuài dāngāo.$

\begin{tabular}{l}
\text{MEI one (/two)-CL student DOU eat one-CL cake} \\
\text{‘Every student eats one piece of cake.’} \\
\text{‘Every two students eat one piece of cake.’}
\end{tabular}$

**Group 3:** perfective marker $le$ can occur with $mei + yi + CL + NP$ constructions, but not with $mei + num + CL + NP$ constructions.

(3) $mei \ yi (/*liăng)-gè xuéshēng chǐ-le $yi-kuài dāngāo.$

\begin{tabular}{l}
\text{MEI one (/two)-CL student eat-ASP one-CL cake} \\
\text{‘Every student ate one piece of cake.’} \\
\text{‘*Every two students ate one piece of cake.’}
\end{tabular}$

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\(^1\) Here we use ‘num’ to represent numbers other than one.

\(^2\) Luo (2009: Chapter 5) discusses data as in Group 2 and Group 3. We will come to his analysis in Section 4.
Group 4: the only case which allows not only \( měi + yī + \text{CL + NP} \) but also \( měi + \text{num + CL + NP} \) is when the predicate in the sentence contains an indefinite object but involves neither \( dōu \) nor a perfective marker.

\[(4)\]  
\[\text{Měi \ yī (/liāng)-gè xuéshēng chǐ yī-kuài dāngāo.}\]  
\[\text{MEI one (/two)-CL student eat one-CL cake}\]  
\[\text{‘Every student eats one piece of cake.’}\]  
\[\text{‘Every two students eat one piece of cake.’}\]

Obviously, restrictions on the occurrence of \( měi + \text{num + CL + NP} \) are directly brought out by \( \text{num} \), since when the number is \( yī \), all the restrictions suddenly disappear. Then why are there such differences between \( měi\)-NPs with \( yī \) and those with \( \text{num} \)? Can these contrasts be nicely accounted for by any of the accounts in the above-mentioned papers? Or is it the case that none of the differences shown by the examples has any implication for the description of the function of \( měi \) and should receive another treatment?

In this paper we propose that viewing \( měi \) as a distributive operator is the most advisable point for explaining the above data as well as other distributions of \( měi \). We take the property of being distributive as a necessary behavior of being sensitive to singularities or atoms, following what is commonly assumed to be distributive in previous literature, and argue that all kinds of \( měi \) nominal constructions (including even \( měi + \text{num + CL} \)) show its sensitivity to singularities. What distinguishes \( měi + yī + \text{CL} \) from \( měi + \text{num + CL} \) is that when the number is larger than one, the atoms in the atomic structure of \( měi \)'s quantification domain become indeterminate: any structure that contains \( \text{num} \)-member groups is fine for the sentence with \( měi + \text{num + CL} \) to be true. It is such a kind of indeterminacy that restricts the co-occurrence of \( měi + \text{num + CL} \) with perfective marker \( le \) and with \( \text{iota} \) operator \( dōu \).

The organization of this paper is as follows. Section 2 is a review of previous discussions on the function of \( měi \) in the literature. We will look into the analyses of Lin (1998) and Cheng (2009) and point out their drawbacks. Section 3 is devoted to arguing for the main proposal of this paper. We agree with Huang (2005) that \( měi \) is a distributive
operator, and we try to support this point by showing that the structure of the quantification domain of měi always contains atoms or singularities, which ensures the invariant characteristic of měi’s being a distributive operator. Section 4 presents a novel analysis of the data presented at the beginning of this paper. It is shown that the distinction in distributions between měi + yī + CL + NP and měi + num + CL + NP can be ultimately traced back to měi’s distributive function. Section 5 presents the conclusion and briefly discusses the remaining issues.


Since our position in this paper is that měi is a distributive operator, and Lin (1998) and Cheng (2009) directly stated that měi is not distributive, we will first review their points in detail here.

Lin (1998) argues that měi is a sum operator rather than a distributive one. His main evidence comes from sentences like the following:

(5) Měi yī zǔ  (de) xiǎohái dōu huà-le yī-zhǎng huà.
    MEI one group de child DOU draw-le one-CL picture
    ‘Every group of children drew one picture.’

Lin points out that in this example the distribution is not down to the individual child, but to the groups of children; if měi is a distributive operator, the result would be that each child drew a picture, but not that each group of children drew a picture. He thus claims that měi actually functions as a sum operator which takes an element of type <e, t> and yields an element of type e which denotes the maximal collection of the individuals expressed by the predicate.

Cheng (2009) agrees on Lin’s (1998) intuition that there is a maximal collection of the individuals involved in (5), but she argues that such a maximal collection is not produced by the měi-NP, but is a result of the cooperation of měi and dōu. In Cheng’s opinion, dōu can be treated as a definite determiner (i.e. the iota operator), introducing the contextual domain restriction for strong quantifiers. In the case of měi-dōu occurrence, měi is a universal quantifier and receives the domain restriction provided by dōu. Such a treatment of the měi-dōu occurrence in Chinese is inspired by data from Chinese free
choice items (FCIs). In Chinese, nǎ-CL as an FCI can occur with or without dōu, and displays a difference between definite and indefinite interpretation just as FCIs in Greek and English do, with definite FCIs expressing an expectation of existence, but not with indefinite FCIs. Thus dōu in FCIs is analyzed as an iota operator. The following are the English examples and their Chinese counterparts (adapted from Cheng 2009).

(6) a. If any student calls, I am not here. b. Whichever student calls, I am not here.
(7) a. Rúguō nǎ-gè rén dā- diànhuà lái, jiù shuō wǒ bù zài. If which-CL person telephone come then say I not be
   ‘If anyone calls, say that I’m not here.’
   b. Wúlùn nǎ-gè rén dā-diànhuà lái, wǒ dōu bù zài. No-matter which-CL person telephone come I DOU not be
   ‘Whoever calls, I’m not here.’

Cheng (2009) argues that the dōu in měi sentences is also an iota operator; dōu as an iota operator provides měi with a contextually determined quantification domain, and helps měi-NP denote a maximal collection of the individuals.

We are of the view that Lin’s point on měi is not without problems. As we can see from examples like (5), Lin’s reasoning is based on an assumption that when an operator takes a plural NP or a collective NP as arguments, in order to assume the operator is distributive, the distribution must be down to atomic individuals the set of which constituting the denotation of those NPs. This seems to us to be dubious. If it were on the right track, then we would judge all in English and suǒyǒu, quánbù, yíqiè in Chinese as distributive operators. As will be shown later on, which is also the common point in literature, what a distributive operator selects as its argument must ensure an atomic structure of the quantification domain, which means that the distribution would never be down to the inner parts of the denotation of the NP chosen by the distributive operator. Moreover, viewing měi as a sum operator runs difficulties when the following data are considered.
If měi can really do summing, then sentences in (8) would be predicted to be true, for the symmetric predicates must select plural individuals as their arguments and the summing function of měi would insure plurality of the argument. The oddity of (8) shows that měi yī-gè rén is not of type e, so it cannot be predicated on by symmetric predicates. (9), on the other hand, is grammatical, showing the difference between tāmen, which is of type e, and měi yī-gè rén, which we propose is of type <e, t>. Note that this is also the problem that Pan et al. (2005) fails to solve, since they also assign měi the summing function, of which the prediction runs counter to the fact in (8).

For Cheng’s point that měi is a universal quantifier, since her analysis shares similarities with Lin’s analysis, and since such an analysis will also fail to distinguish between měi and suoyōu, quánbù, yìqiè, we think it is not the most advisable account.

Agreeing with Huang (2005), Our position is that, měi, in actuality, is a distributive operator. We propose our further reasoning in the next section.

3. měi as a distributive operator

3.1. The structure of the quantification domain of měi

The main evidence for měi’s being a distributive operator comes from the shape of the structure of měi’s quantification domain. As is discussed in previous literature (Link 1983, Chierchia 1998, among others), the property of a quantifier always requires that the structure of its domain be of some shape. This is so because there is a diversity of the

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3 These examples are proposed by Haihua Pan (p.c.).
structure of the domain of discourse and different quantifiers are sensitive to different structures. The diversity of the discourse structure can be described in terms of lattice structure (Link (1983) and Landman (1989)), which manifests itself as singularities, pluralities or the U-closed sets of atoms. Domains with different shapes constitute denotations of different types of NPs — singularities are the denotation of singular definite NPs, pluralities are the denotation of plural definite NPs, and the U-closed sets of atoms the denotation of mass nouns. The following shape, quoted from Chierchia (1998b), completely contains the three types of denotations: the individuals at the bottom are the singularities; the sets above the individuals are the pluralities; and the whole is the U-closed sets of atoms constituting a complete atomic semilattice structure which qualifies as the denotation of mass nouns.

\[
\begin{align*}
\{a, b, c, d, \ldots\} \\
\{a, b, c\} & \{a, b, d\} & \{b, c, d\} & \{a, c, d\} & \ldots \\
\{a, b\} & \{a, c\} & \{a, d\} & \{b, c\} & \{b, d\} & \{c, d\} & \ldots \\
\textbf{a} & \textbf{b} & \textbf{c} & \textbf{d} & \ldots &= \text{At}
\end{align*}
\]

Since a quantifier has to take an NP argument as its restriction, the denotation of the NP usually restricts the structure of the quantification domain the quantifier operates on; or we can say that a quantifier which takes certain kind of NP as arguments has certain requirement for the shape of the structure of its quantification domain. Take English quantifiers for example. We can give the following classification (adapted from Chierchia (1998b)).

(11) **English quantifiers**
- **Singular quantifiers:** *every, each*
- **Plural quantifiers:** *many, few, several, a few*
- **Mass quantifiers:** *much, little, a little*
- **Sg+Pl+M quantifiers:** *the, no, some, any*

Related to our discussion of *měi* is the first line of (11), where *every* and *each* are classified into singular quantifiers. *měi*, as will be shown below, can also be viewed as a
singular quantifier. Consider the following data.

(12) a. měi (yī) běn shū  
      MEI (one) CL book  
      *měi shū  
      MEI book  
      (‘every book’)  

b. měi (yī) gè xuéshēng  
      MEI (one) CL student  
      *měi xuéshēng  
      MEI student  
      (‘every student’)  

c. měi (yi) shēng shuǐ  
      MEI (one) CL water  
      *měi shuǐ  
      MEI water  
      (‘every liter of water’)  

Those ungrammatical expressions in (12) show that měi is unable to combine with common nouns without CLs in between. Then what properties do Chinese common nouns have? And what does the CL contribute to realization of měi’s function?

Chinese common nouns, as discussed in Chierchia (1998a, b), can be viewed as mass nouns denoting U-closed sets of atoms, since they always occur bare and do not differentiate between mass and count semantically and morphologically. Classifiers are then indispensable to ensure the combination of numerals with nouns, mapping or partitioning pluralities into atoms on which counting can be done. In the case of měi, as illustrated in (12), classifiers are obligatory to make měi-NPs legitimate, from which we may conclude that měi in Chinese is parallel to every in English in that both require the domain of quantification contain atoms or singularities. The requirement of měi for classifiers contrasts sharply with suǒyōu, quánbù, yìqiè and rènhé. The latter can precede common nouns without the help of classifiers.  

(13) a. suǒyōu / quánbù / yìqiè (*gè) xuéshēng  
      all / all / all (CL) student  
      ‘all students’  

b. rènhé (*gè) wèntí  
      any (CL) problem  
      ‘any problem’  

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4 rènhé can be analysed as expressing FCs (free choices) in Mandarin Chinese, which is often followed either by common nouns, as in rènhé xuéshēng (‘any student’), or by yī + CL + NP, as in rènhé yī gè xuéshēng (lit. any one student). But rènhé cannot be followed directly by a classifier plus a common noun, as in *rènhé gè xuéshēng.
c. měi *(gè) xuéshēng
    MEI (CL) student   ‘every student’

For suǒyǒu, quánbù, yíqiè and rènhé, we can assume that the domain they quantify over must be plural (for the first three), or may be plural (for the last one), contra the domain selection of měi.

We have thus demonstrated the distributive property of měi by anatomizing the nominal construction měi + (yī +) CL + NP. The reader can see that what we basically adopt for our argumentation is the thesis that being distributive is merely being sensitive to singularities (this idea is also used in Chierchia 1998b). Based on this point, there is no doubt that cases as in (12) exactly show that měi is a distributive operator. But note that besides individual classifiers such as bèn (in (12a)) and gè (in (12b)) and measurers such as shēng (in (12c)), there are also group-like classifiers which can occur in měi-NPs, as is shown in (14). Recall that Lin (1998) uses examples containing měi yī-zū xiăohái (‘every group of children’) to prove that měi is a sum operator rather than a distributive one. In what sense can they be incorporated into the distribution usage of měi?

(14) a. měi (yī) zǔ xuéshēng
    MEI (one) group student   (‘every group of students’)
b. měi (yī) dùi shū
    MEI (one) pile book   (‘every pile of books’)
c. měi (yī) shuāng xiézi
    MEI (one) pair shoes   (‘every pair of shoes’)

Besides providing an account of the examples in (14), another step to be taken, if we want to defend the thesis that měi is a distributive operator, is that we need to solve the issues proposed at the beginning of this paper, namely the issues concerning měi + num + CL. How can we still think that měi is a distributive operator when the number involved is apparently larger than one?

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5 Chierchia (1998b) said: “For example, a distributive universal quantifier like every must be restricted to singularities, for that is what being distributive means.”
3.2. Cases with \( měi + yī + zū \) and \( měi + \text{num} + \text{CL} \)

Cases in (14) are comparatively easier to deal with. In traditional Chinese grammar, classifiers like \( zū \), \( duī \) and \( shuāng \) are viewed as collective classifiers in contrast with individual classifiers as in (12a, b) (see Fang 1992, among others); they apply to a plurality of individuals to form a group, a pile, a pair, etc. Yet, pluralities reflected by collective classifiers are different from pluralities isolated purely by plural nouns or mass nouns. Pluralities in plural nouns and mass nouns, we can say, are merely abstract sets of atoms; that is, we take the atoms as being together simply because the morphological form of the noun encodes such information. Pluralities in collective classifiers, however, are not abstract but concrete: atoms involved are tightened together by some visible or real criterion\(^6\). Chierchia (1998b) has discussed collective nouns like committee, pile, bunch, group in English.

The abstract-vs.-concrete distinction between group-level plurality and set-level plurality and criteria-associated analysis for groups mentioned above are exactly what Chierchia used in his paper. Based on the difference in plurality between collective nouns and plural nouns, Chierchia suggests that collective nouns be viewed as denoting atomic individuals rather than pluralities and thus the set \( \text{At} \) of atoms (recall the bottom line of the picture in (10)) in the domain of discourse be sorted into groups and ordinary individuals. We think that Chierchia’s treatment of English collective nouns can be modeled for the treatment of Chinese collective classifiers: collective classifiers in Chinese map pluralities into group-like atoms. And since \( měi \) in cases with collective classifiers also selects atoms, just as what it does with individual classifiers, we can of course take it as a distributive operator.

The difficulty seemingly lies with \( měi + \text{num} + \text{CL} \). We can easily perceive \((yī+)\) \text{CL} + NP as denoting atoms or singularities, even if the classifier is a collective one, as is analyzed above. But when the number is \( liăng \) (‘two’) or \( sān \) (‘three’), as in \( měi \text{liăng/sān gè rèn} \) (‘every two/three persons’), isn’t it obvious that the denotation of num-CL becomes plural?

\(^6\) More will be said on the property of such criteria when we discuss the difference between \( měi \text{ yī zū} \) and \( měi \text{ liăng gè rèn} \).
The answer, however, is still negative. In such a case, we still have singularities, only that the criterion for shaping atoms is different from that for cases with collective classifiers. We have discussed the ways for collective classifiers to be taken as mapping pluralities into atoms—the mapping is not arbitrary; rather, it is based on some criterion. The criteria for grouping are what individual atoms share together—members in the same group satisfy the same criterion, and are contextually determined—they can either be some property manifested by the members themselves, e.g. sex, age for human beings, color, size, space arrangement for materials, etc., or the events the members participate in. Whichever criterion the grouping is based on, the criterion must be perceivable. That is, if the grouping criterion is the event the members participate in, the event must be what has happened or is taking place: only under this situation can we discern the groups because it is the events that tie up the sub-participants and make them form a group. Since the ongoing of the event can be a criterion for grouping, we may say *every group of children drew a picture* even if the children in the same group have different sex, different age or wear different fraternity.

On the other hand, if the event has not yet taken place and we have not got natural groups formed by contextually-determined criterion, for example, if we face a classroom of students who stand together without following any order, it is unlikely that we give such orders like *every group of students draw a picture* unless we have partitioned the whole students into different groups. We can group the students by, say, age or sex, so we often hear such statements in Chinese like *nǎnnǚ tóngxué fēnchéng liǎng-zū, měi yī-zū ná yīgè qiú* (‘Boys be one group and girls be one group. Each group get one ball.’) in PE classes. We can also group the students by what the event requires for the number of the members which qualifies as its minimum legitimate participants. (We will mention this requirement simply as ‘the number requirement’ henceforth.)

The latter, namely the number criterion, is the most crucial for our argumentation. When the event has not yet taken place and we only know the number requirement of the event, we have not got existing groups as the participants of the event. However, we still can use the number requirement as a ‘signal’ of the group-like participants and let *měi* choose it as its argument. That is what we have in *měi liǎng/sān-gè rén*. It is reasonable to take what num-CL does as packing individual atoms as group-like atoms, for when the event involved in *měi*-sentences only requires that the minimum legitimate participant be
individual atoms, what měi chooses as its argument would never exceed the size of individual atoms, as is shown in the examples in Group 1 in Introduction, repeated here as (15). We add one more example as in (15b).

(15) a. Měi yī (/*liāng)-gè xuéshēng dōu biyè-le.
   MEI one (two)-CL student DOU graduate-SFP
   ‘Every student graduated.’
   *’Every two students graduated.’

b. Liāng-gè xuéshēng dōu biyè-le.
   Two-CL student DOU graduate-SFP
   ‘Both of the students have graduated.’

graduate is a distributive predicate which can only be true of atomic individuals\(^7\). We can say both of the students have graduated (as in (15b)), describing a case where there are two specific students who are known by both the speaker and the hearer and they have graduated. In such a case graduate is not applied to the group denoted by both of the students but to each of the two students. In other words, both of the students do not denote a group; it only denotes the sum of individuals: \(a \oplus b\)\(^8\) (assuming that the two students are \(a\) and \(b\)).\(^9\)

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\(^7\) Here the term ‘distributive predicate’ is defined on the basis of whether a predicate is predicated on individual atoms or not. Link (1983) gives a formula which defines what being a distributive predicate means.

\(\text{i) } \text{Distr}(P) \leftrightarrow \forall x \ (P x \rightarrow \text{At}(x))\)

This formula is paraphrased as “for a predicate \(P\) is distributive, if and only if for all \(x\), if \(P\) is true of \(x\) then \(x\) is an atomic individual”. But adopting the argumentation of this paper, we can think of any predicate as distributive since following Chierchia (1998) we have augmented in \(\text{At}\) groups as one sort of atoms. The traditional definition of distributive predicate is based on naturally existing atoms as a starting viewpoint, while if we think that all predicates are distributive we are taking the requirement of the event for its minimum legitimate participant as a basis and think that it is such a requirement that determines whether a certain number of individuals is a group or only forms a set of atoms.

\(^8\) Link (1983) used the sign \(\oplus\) to indicate the sum operator.

\(^9\) Following Link (1983), we can give (16c) the following semantic formula:

\(\text{i) } *Q (\sigma *x \ P x) \quad P x: x\text{ is a student} \quad Q: \text{graduated}\)

To accurately represent the distributive meaning of (16c), the star-operation on \(Q\) is needed; otherwise we got the collective reading where the group of those two students graduated, which is
(15b) shows that although the number of the members involved in the subject nominal expression exceeds the size of the minimally legitimate participant the event requires, the predicate can still predicate it and the distributive reading is automatically produced. However, when the operator mei is added, as in (15a), we get an ungrammatical sentence since what the event requires for the size of its minimum legitimate participant does not match what mei chooses as its argument. This proves that what mei chooses as its argument must be an atom, or a singularity, since without thinking of it this way, it would be predicted that the distributive predicate graduate behaves the same way as it does in (15b) and thus (15a) would be perfect with the distributive reading automatically produced. Since the fact is to the contrary, we think even in cases with mei + num + CL what mei chooses are atoms but not pluralities.

3.3. Indeterminacy of the structure of the quantification domain for mei + num + CL

According to the above analysis, it is the distributive predicate that causes the unacceptability of (15b). Being that as it may, what if we substitute a collective predicate for graduate? For instance, what if we substitute lift a piano for graduate? The result, we find, is still unacceptable, as (16) shows.

(16) *mei liăng-gè xuéshēng dōu táiqī-le yī-jìà gāngqín.
     MEI two-CL student DOU lift-le one-CL piano
     ‘Every two students lifted one piano.’

However, according to our analysis above, (16) is predicted to be true, for the mismatch between what mei chooses as its argument and the number requirement of the event is gotten rid of by using the collective predicate lift a piano, which is often carried out by more than one people. That such a prediction is not borne out forces us to look more deeply into these examples. Is it that our analysis is not on the right track, or is it that there are some other factors that influence the acceptability of sentences containing mei + num + CL as a subject and a collective predicate? (17) shows that keeping the same subject and predicate while omitting dōu and the perfective marker le can turn the meaningless in the actual world.
sentence into a grammatical one.

(17) Měi liǎng-gè xuéshēng tái yǐ-jìà gāngqín
MEI two-CL student lift one-CL piano
‘Every two students lift one piano.’

Remember we have proposed this phenomenon at the beginning of the paper (as shown be examples in Group 2). What is crucial behind this fact, we suspect, concerns the function of aspect marker le and the so-called iota operator dōu, and the indeterminacy of the structure of the quantification domain of měi + num +CL. Here we discuss the latter and leave discussions of le and dōu to the next section.

We have argued that both měi’s in měi yī-zū and měi liǎng-gè rén choose atoms as arguments. If in ‘měi yī-zū’ \(|p(x)| = 2\), namely the cardinality of \(p(x)\) is 2, and since in ‘měi liǎng-gè rén’, měi also chooses groups containing two persons as arguments, can we say the domain for měi yī-zū and that for měi liǎng-gè rén have the same structure? Hardly, it would seem. As we have mentioned above, zū is used for cases when there are contextually-determined groups. In this sense, then, we can say that the structure of the quantification domain for měi in měi yī-zū is contextually set, consisting of different groups which act as atoms. Since the groups are invariant at the point when they are conceived of as groups under the criterion, the structure of the domain consisting of such invariant atoms is also stable.

Měi liǎng-gè rén is, however, totally different from the above picture in that the quantification domain has an indeterminate structure. The domain structure is indeterminate because the atoms contained in it are under-determined. The only property we know about the structure is that the atoms of the structure must be groups of two members——this is expressed by the number liǎng. Nothing beyond this is conveyed. The requirement for the cardinality of the members of the groups can be met by several possibilities, since one individual can combine with any other individual to form a 2-member group. So, if there are 6 persons, \(a, b, c, d, e, f\) in the domain, we will find 15

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10 Following Chierchia (1998), here \(x\) represents variables over groups introduced by zū, and \(p\) is a function from group into the plurality or set constituting that group. After the type shifting, we can then calculate the cardinality.
possibilities meeting the requirement that in each group there are 2 members.

(18) \[ \{\{a, b\}, \{c, d\}, \{e, f\}\}, \{\{a, b\}, \{c, e\}, \{d, f\}\}, \{\{a, c\}, \{b, d\}, \{e, f\}\}, \{\{a, c\}, \{b, f\}, \{d, e\}\}, \{\{a, d\}, \{b, c\}, \{e, f\}\}, \{\{a, d\}, \{b, f\}, \{c, e\}\}, \{\{a, d\}, \{b, e\}, \{c, f\}\}, \{\{a, e\}, \{b, d\}, \{c, f\}\}, \{\{a, e\}, \{b, f\}, \{c, d\}\}, \{\{a, f\}, \{b, e\}, \{c, d\}\}, \{\{a, f\}, \{b, d\}, \{c, e\}\} \]

*měi liǎng-gè rén* can be true of all these structures since in each of them the groups are of two members, meeting the cardinality requirement. Then can we tell which of the 15 possible structures finally enters into the event? The answer is, we cannot do so until the event happens. The difference between *měi yī-zū* and *měi liǎng-gè rén* is thus made clear. The crucial point is whether the structure of the domain is determined or not. For *měi yī-zū*, the structure is determined, containing groups of n members which are set by some contextual criterion; for *měi liǎng-gè rén*, however, the structure is not determined—any structure that contains 2-member groups is fine for the sentence to be true.

4. Explanations for the incompatibility between *měi* + num + CL and perfective marker le and iota operator dōu

Out of the relevant literature that we have consulted, only Luo (2009) discusses the issue of why *měi* + num + CL cannot co-occur with *dōu*. Luo argues that *dōu* is an event-associated distributive quantifier; that is, *dōu* maps individuals or events into events only, but not into individuals. However, sentences with *měi* + num + CL as in *měi wǔ-gè rén zuò yī-tiáo chuán* (‘every five people take one boat’) has nothing to do with events, since they do not allow perfective marker *le*, which marks the existence of events, hence the oddity when *dōu* occurs.

In Luo (2009), the incompatibility between *měi* + num + CL and the perfective marker *le* was only mentioned as a piece of evidence for *měi* + num + CL sentences’
being eventless; no further analysis was provided for why such a kind of měi sentences have the property of being eventless and thus exclude le. In this section we will attempt to provide an explanation, and we will explain why dōu is always also excluded in sentences with měi + num + CL.

4.1. le’s episodicity vs. the indeterminacy of the domain structure of měi + num + CL

In Giannakidou & Cheng (2006), Chinese perfective marker le is analyzed as the signal of episodic sentences. Episodic sentences in G&C (2006) mean sentences ‘involv[ing] (in a particular world) just one event that happens at a particular point in time’ and are thus ‘event-specific’. That měi + num + CL fails to co-occur with le suggests that měi + num + CL sentences are anti-episodic, or as in Luo (2009), eventless. Then why does měi + num + CL cause such an effect? The answer, we suggest, lies in the indeterminacy of the domain structure of měi + num + CL. We have pointed out in section 3 that although měi in měi + num + CL invariably selects atoms (i.e. groups) as its argument, just as what it does in měi + yī + CL, the atomic structure is indeterminate in the sense that any structure that contains num-member groups is fine for the měi + num + CL sentence to be true. We have seen that for a domain containing 6 persons, there are 15 possibilities for měi liǎng gè-rén (lifting a piano) to be true. Due to this fact, we have no way to get specific events, hence the incompatibility of měi + num + CL with le.

4.2. dōu as the iota operator

Dōu co-occurs very well with měi + (yī+) CL, and in most cases such a co-occurrence is obligatory. Thus the incompatibility between měi + num + CL and dōu gives us a seeming surprise. However, if we recall that the structure of the quantification domain has an indeterminacy property for měi + num + CL, and adopt G&C’s (2006) point that dōu in Chinese is exactly the iota operator which yields the maximality effect, such a phenomenon is easy to account for. That is, the indeterminacy of the structure of the quantification domain makes the iota operator undefined. The definition for 1, as in Landman (1991) or Chierchia (1998), requires that it pick out the greatest element of a set. But if the elements of a set are not yet determined, then how can the greatest element be picked out?

The indeterminacy of the structure of quantification domain of měi + num + CL
reminds us of the indeterminacy of FCIs. It is commonly assumed that there is an indeterminacy property for the denotation of the FCI, since it bears a possible world variable $w$ and does not have a stable denotation. Chinese FCIs are often expressed by wh-NPs with or without $dōu$. One of the wh-words, nā (‘which’), behaves in the same way as měi in that nā can also be followed by yi-CL or num-CL. Can nā be followed by num-CL when used as an FCI?

(19) a. nā yī-duì (/liāng-gè rén) tái zhuōzi lái wǒ dōu bù shōu.
   Which one-pair (two-CL person) carry desk come I DOU not accept
   ‘Whichever pair carries the desk here, I will not accept it.’
   ‘*Whichever two persons carry the desk here, I will not accept it.’

The question marker shows that the sentence is marginal, probably suggesting that the FCI only allows indeterminacy over different possible worlds, but does not allow indeterminacy over different possible values in one world.

5. Recapitulations and remaining issues

This paper analyzes the function of měi. Assuming the distributive property as an absolute property of being sensitive to singularities (or atoms), we propose the thesis that měi is really a distributive operator by anatomizing the structure of the quantification domain of měi + yī/num + CL. Being a distributive operator, měi always selects atoms as its argument. However, when followed by a num-CL sequence, the atomic structure shows indeterminacy with respect to the atoms contained. It is such an indeterminacy property that determinates the anti-episodicity of měi + num + CL sentences, and excludes the occurrence of $dōu$, which is the iota operator and can only be defined on a set with stable elements.

There are still some remaining issues. We have observed that měi + num + CL cannot co-occur with $dōu$. But if something else is added, for example, if zhī (‘only’) is added in the predicate, the sentence becomes fine, as in (20). What does zhī contribute

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11 Thanks to Lingfei Wu for reminding the first author of such a kind of měi sentences, and thanks to Shizhe Huang and Xiaogang Li for discussing such a phenomenon and other issues concerning měi with the first author.
to rescue the sentence? We leave this issue open.

(20)  Měi liǎng-gè xuéshēng dōu zhī chǐ yī-kuài dàngāo.
MEI two-CL student DOU only eat one-CL cake
‘Every two students only eat one piece of cake.’

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