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The Function of *mĕi* in *mĕi*-NPs*

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This paper analyses the function of *mĕi*. Assuming the distributive property as an absolute property of being sensitive to singularities (or atoms), we propose that *mĕi* is really a distributive operator by observing the structure of the quantification domain of *mĕi* + *yī*/num + CL. Being a distributive operator, *mĕi* 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 *mĕi* + 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

Mĕi 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 *mĕi* 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 *mĕi* is to be better described as a distributive operator.

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

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numbers larger than *yi*. What is interesting is that when the number following *měi* is larger than one, the distribution of the *měi* + num + CL + NP construction[1] is highly restricted compared with *měi* + *yī* + CL + NP. This is illustrated by the following examples.

Group 1: distributive predicates can be predicated on *měi* + *yī* + CL + NP constructions, but not on *měi* + num + CL + NP constructions.

(1) Měi yī (/*liăng)-gè xuéshēng dōu bìyè-le.
MEI one (/two)-CL student DOU graduate-SFP
'Every student graduated.'
'*Every two students graduated.'

Group 2: *dōu* occurs well with *měi* + *yi* + CL + NP constructions, but not with *měi* + num + CL + NP constructions.[2]

(2) Měi yī (/*liăng)-gè xuéshēng dōu chī yī-kuài dàngāo.
MEI one (/two)-CL student DOU eat one-CL cake
'Every student eats one piece of cake.'
'Every two students eat one piece of cake.'

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

(3) Měi yī (/*liăng)-gè xuéshēng chī-le yī-kuài dàngāo.
MEI one (/two)-CL student eat-ASP one-CL cake
'Every student ate one piece of cake.'
'*Every two students ate one piece of cake.'

[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* + CL + NP but also *měi* + num + CL + NP is when the predicate in the sentence contains an indefinite object but involves neither *dōu* nor a perfective marker.

(4) Měi yī (/liǎng)-gè xuéshēng chī yī-kuài dàngāo.
MEI one (/two)-CL student eat one-CL cake
'Every student eats one piece of cake.'
'Every two students eat one piece of cake.'

Obviously, restrictions on the occurrence of *měi* + num + CL + NP are directly brought out by 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 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* + num + CL) show its sensitivity to singularities. What distinguishes *měi* + *yī* + CL from *měi* + 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 num-member groups is fine for the sentence with *měi* + num + CL to be true. It is such a kind of indeterminacy that restricts the co-occurrence of *měi* + num + CL with perfective marker *le* and with *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.

2. Previous research on měi: Lin (1998) and Cheng (2009)

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-zhāng 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. Rúguǒ nǎ-gè rén dǎ- 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 dǎ-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.

(8) a. * Měi yī-gè rén dōu shì tóngxiāng.[3]
MEI one-CL person DOU is same-town-folks
'* Everyone is a from the same hometown'
b. * Měi yī-gè rén dōu shì fūqī.
MEI one-CL person DOU is couple
'*Everyone is a couple.'

(9) a. Tāmen dōu shì tóngxiāng.
They DOU are same-town-folks
'They are from the same hometown.'
b. Tāmen dōu shì fūqī.
They DOU are couple
'They are couples.'

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 *suǒyǒu*, *quánbù*, *yíqiè*, 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

[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.

(10)

{a, b, c, d, …}
{a, b, c} {a, b, d} {b, c, d} {a, c, d} …
{a, b} {a, c} {a, d} {b, c} {b, d} {c, d} …
a b c d … = At

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 * měi shū
MEI (one) CL book MEI book ('every book')
b. měi (yī) gè xuéshēng * měi xuéshēng
MEI (one) CL student MEI student ('every student')
c. měi (yi) shēng shuǐ * měi shuǐ
MEI (one) CL water 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 indispensible 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 *suǒyǒu*, *quánbù*, *yíqiè* and *rènhé*. The latter can precede common nouns without the help of classifiers.[4]

(13) a. suǒyǒu / quánbù / yíqiè (*gè) xuéshēng
all / all / all (CL) student 'all students'
b. rènhé (*gè) wèntí
any (CL) problem 'any problem'

[4] *rènhé* can be analysed as expressing FCs (free choices) in Mandarin Chinese, which is often followed either by common nouns, as in *rènhé xuésheng* ('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[5]). 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 *běn* (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-zǔ xiǎohái* ('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) duī 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?

[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* + *zǔ* and *měi* + num + CL

Cases in (14) are comparatively easier to deal with. In traditional Chinese grammar, classifiers like *zǔ*, *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 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* + num + CL. We can easily perceive (*yī*+) CL + NP as denoting atoms or singularities, even if the classifier is a collective one, as is analyzed above. But when the number is *liǎng* ('two') or *sān* ('three'), as in *měi liǎng/sān gè rén* ('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 yī zǔ* and *měi liǎng gè rén*.

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 on-going 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 *nánnǚ tóngxué fēnchéng liǎng-zǔ*, *měi yī-zǔ 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 (/*liǎng)-gè xuéshēng dōu bìyè-le.
MEI one (two)-CL student DOU graduate-SFP
'Every student graduated.' '*Every two students graduated.'
b. Liǎng-gè xuéshēng dōu bìyè-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⊕b[8] (assuming that the two students are *a* and *b*).[9]

[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.

(i) $Distr\ (P) \leftrightarrow \wedge x\ (Px \rightarrow At\ (x))$

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 *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 ⊕ to indicate the sum operator.

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

(i) $*Q\ (\sigma *x\ Px)$ Px: x is a student Q: 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 *měi* 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 *měi* chooses as its argument. This proves that what *měi* 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 *měi* + num + CL what *měi* chooses are atoms but not pluralities.

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

According to the above analysis, it is the distributive predicate that causes the un-acceptability 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) *měi liǎng-gè xuéshēng dōu táiqǐ-le yī-jià 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 *měi* 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 *měi* + 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 liăng-gè xuéshēng tái yī-jià 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 *mĕi* + num +CL. Here we discuss the latter and leave discussions of *le* and *dōu* to the next section.

We have argued that both *mĕi'*s in *mĕi yī-zŭ* and *mĕi liăng-ge rén* choose atoms as arguments. If in '*mĕi yī-zŭ*' $|p(\mathrm{x})|$ = 2, namely the cardinality of *p*(x) is 2, and since in '*mĕi liăng-ge rén*', *mĕi* also chooses groups containing two persons as arguments, can we say the domain for *mĕi yī-zŭ* and that for *mĕi liăng-gè rén* have the same structure? [10] Hardly, it would seem. As we have mentioned above, *zŭ* is used for cases when there are contextually-determined groups. In this sense, then, we can say that the structure of the quantificational domain for *mĕi* in *mĕi yī-zŭ* 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.

Mĕi liăng-gè rén is, however, totally different from the above picture in that the quantificational 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 *liăng*. 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

[10] Following Chierchia (1998), here *x* represents variables over groups introduced by *zŭ*, 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, b}, {c, f}, {d, e}}
{{a, c}, {b, d}, {e, f}}
{{a, c}, {b, f}, {d, e}}
{{a, c}, {b, e}, {d, f}}
{{a, d}, {b, c}, {e, f}}
{{a, d}, {b, f}, {c, e}}
{{a, d}, {b, e}, {c, f}}
{{a, e}, {b, f}, {c, d}}
{{a, e}, {b, d}, {c, f}}
{{a, e}, {b, c}, {d, f}}
{{a, f}, {b, e}, {c, d}}
{{a, f}, {b, c}, {d, e}}
{{a, f}, {b, d}, {c, e}}

měi liăng-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-zŭ* and *měi liăng-gè rén* is thus made clear. The crucial point is whether the structure of the domain is determined or not. For *měi yī-zŭ*, the structure is determined, containing groups of n members which are set by some contextual criterion; for *měi liăng-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 wŭ-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 ι, 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, *nǎ* ('which'), behaves in the same way as *měi* in that *nǎ* can also be followed by *yi*-CL or num-CL. Can *nǎ* be followed by num-CL when used as an FCI?

(19) a. nǎ yī-duì (/?liǎng-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 *zhǐ* ('only') is added in the predicate, the sentence becomes fine, as in (20).[11] What does *zhǐ* contribute

[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 liăng-gè xuéshēng dōu zhĭ chī 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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