

Notes on the Determiner *Ge* and Related Problems

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1. Introduction

This work presents some reflections on the determiner *ge* ‘each, numerous’ in Mandarin Chinese, focusing on its quantificational properties and related questions. T.-H. Lin (1998, 2004) examines the syntactic and semantic properties of *ge*; also see Kung 1993 and Soh 1998). But these works only discuss the adverbial use of *ge*, not its determiner use. The following examples illustrate the two uses of *ge*.

- (1) a. Tamen *ge* mai-le yi-ding maozi.
they GE buy-PERF one-CL hat
‘They each bought a hat.’
- b. Ge-zhong dongwu dou yangyu xia-yi-dai.
GE-kind animal all breed next-one-generation
‘All kinds of animal breed younger generations.’

This work is devoted to the uses of *ge* of (1b) type. Specifically, I will argue for the following points. 1. The determiner *ge* is sensitive to the *existential import* of the classifier that co-occurs with it. 2. The determiner *ge* doesn’t have inherent quantificational force; the sequence *ge*-CL-NP, henceforth abbreviated as the *ge*-NP, is like a plural nominal, and thus behaves as a variable in the sense that it needs to be licensed by an independent quantificational element. 3. The quantificational determiner *mei* ‘every’ in Mandarin Chinese exhibits variable-like properties as well, though not as extensive as *ge*. That is, the domain of quantification of *mei* ‘every’ needs to be restricted by an independent quantificational element. The crucial difference between *ge* and *mei* is that *ge* doesn’t have inherent quantificational force, but *mei* does. 4. The distributivity operator *dou* ‘all’ provides a generator set for the element it is said to distribute over.

This work is organized as follows. Section 2 shows that the determiner *ge* can only occur with a subset of classifiers that can occur with other more typical

determiners in Mandarin Chinese. Section 3 presents examples to show that the determiner *ge* is not really quantificational; its semantic interpretation changes in different syntactic positions. This phenomenon can be accounted for if we assume that *ge* doesn't have inherent quantificational force but needs to be licensed by some other quantificational element. Section 4 comes back to the question of classifiers that can/cannot occur with the determiner *ge*, and shows that those classifiers that can occur with *ge* must be *nonexistential*, in the sense that they don't have to denote (sets of) individuals that exist. Section 5 discusses the quantificational determiner *mei* 'every' and shows that, similar to *ge*, the interpretation of *mei* 'every' is sensitive to syntactic positions and this can be attributed to the need of *mei* 'every' that its domain of quantification be restricted. Section 6 is devoted to *dou* 'all' and its role in *mei* 'every' quantification. It is argued that an essential function of *dou* is to provide a restriction for the element said to be distributed by *dou*. Section 7 is the conclusion.

2. *Ge* and Classifiers

Superficially, the determiner *ge* looks very similar to the quantificational determiner *mei* 'every'.¹ Compare the following examples.

- (2) a. *Ge-zhong dongwu dou yangyu xia-yi-dai.*
 GE-kind animal all breed next-one-generation
 'All kinds of animals breed younger generations.'
- b. *Mei-zhong dongwu dou yangyu xia-yi-dai.*
 every-kind animal all breed next-one-generation
 'Every kind of animal breeds younger generations.'

The glosses of these two sentences indicate that these two determiners exhibit the same

¹ We call *ge* here a determiner just for ease of exposition; in fact, *ge* shows property distinct from those of the more typical kind of determiners in Mandarin Chinese, such as *zhe* 'this', *na* 'that', and *mei* 'every'. For example, *ge* doesn't take a numeral:

- | | |
|--|--|
| (i) a. <i>ge-zhong dongwu</i>
GE-kind animal | b. <i>*ge-yi-zhong dongwu</i>
GE-one-kind animal |
| (ii) a. <i>zhe-/ na- / mei-zhong dongwu</i>
this that every-kind animal | b. <i>zhe-/ na- / mei-yi-zhong dongwu</i>
this that every-one-kind animal |

We will leave the relevant questions aside.

quantificational properties: both are universal, and both are distributive. However, further comparisons reveal that *ge* and *mei* differ in a number of important aspects. In particular, the classifiers that *ge* can take are strictly limited (Lü 1981). Roughly speaking (to be sharpened later), the classifiers that can occur with *ge* are limited to those that denote kinds, groups, collections, social institutions, and other abstract entities. *Mei* is unrestricted in this regard. Look at the following examples.²

(3) *Classifiers that ge cannot take*

a.	mei-zhi	bi	a'.	*ge-zhi	bi
	every-CL	pen		GE-CL	pen
	'every pen'			'each pen'	
b.	mei-zhang	zhuozi	b'.	*ge-zhange	zhuozi
	every-CL	table		GE-CL	table
	'every table'			'each table'	
c.	mei-tiao	yu	c'.	*ge-tiao	yu
	every-CL	fish		GE-CL	fish
	'every fish'			'each fish'	
d.	mei-bei	shui	d'.	*ge-bei	shui
	every-cup	water		GE-cup	water
	'every cup of water'			'each cup of water'	
e.	mei-xiang	shu	e'.	*ge-xiang	shu
	every-box	book		GE-box	book
	'every box of books'			'each box of books'	
f.	mei-tian	zaoshang	f'.	*ge-tian	zaoshang
	every-day	morning		GE-day	morning
	'every day morning'			'each day morning'	

(4) *Classifiers that ge can take*

a.	ge-zhong	dongwu	a'.	mei-zhong	dongwu
	GE-kind	animal		every-kind	animal

² Some of the *mei* 'every' examples in (3) and (4) don't sound very natural; those examples can be improved if the number *yi* 'one' is inserted between *mei* and the classifier. I leave this complication aside. Yang (2001) points out that the sequence *mei*-CL-NP is semantically equivalent to *mei-yi*-CL-NP.

	‘each kind of animal’		‘every kind of animal’
b.	ge-xiang bisai	b’.	mei-xiang bisai
	GE-entry race		every-entry race
	‘each race’		‘every race’
c.	ge-men xueke	c’.	mei-men xueke
	GE-branch subject		every-branch subject
	‘each subject’		‘every subject’
d.	ge-xing wuqi	d’.	mei-xing wuqi
	GE-type weapon		every-type weapon
	‘each type of weapon’		‘every type of weapon’
e.	ge-lei zhiwu	e’.	mei-lei zhiwu
	GE-kind plant		every-kind plant
	‘each type of plant’		‘every type of plant’
f.	ge-dong dalou	f’.	mei-dong dalou
	GE-CL building		every-CL building
	‘each building’		‘every building’
g.	ge-suo xuexiao	g’.	mei-suo xuexiao
	GE-CL school		every-CL school
	‘each school’		‘every school’

The examples in (3) and (4) show that the classifiers that *ge* can take only constitute a proper subset of the classifiers that *mei* can take. Notice incidentally that all the classifiers in (3-4) can follow an ordinary kind of determiner, such as *na* ‘that’. We omit the relevant examples.

3. GE AND QUANTIFICATIONAL FORCE

Earlier it was pointed out that *ge*, like *mei*, appears to exhibit universal force; see (2b). But further examination shows that this statement doesn’t seem correct. In fact, the *ge*-NP exhibits different quantificational properties in different syntactic positions. Consider the following examples.

- (5) a. Ge-zhong dongwu dou yangyu xia-yi-dai. (*ge*-NP universal)
 GE-kind animal all breed next-one-generation

- ‘All kinds of animals breed younger generations.’
- b. Laowang yang-le ge-zhong dongwu. (ge-NP existential)
 Laowang pet-PERF GE-kind animal
 ‘Laowang pets a variety of animals.’
- c. Laowang xihuan ge-zhong dongwu. (ge-NP universal)
 Laowang like GE-kind animal
 ‘Laowang likes all kinds of animals.’

In (5a), the *ge*-NP occurs as the subject of the sentence, which also contains the distributivity operator *dou* ‘all’. In this sentence the *ge*-NP is universal. In (5b), the *ge*-NP occurs as the object of the sentence; however, in this case, the *ge*-NP has an existential reading, as the gloss ‘a variety of animals’ indicates. In (5c), the *ge*-NP occurs as the object of the sentence, but unlike (5b), the main verb of the sentence is static. In this case the *ge*-NP assumes the universal reading. This pattern is reminiscent of the bare plural in English, which Diesing (1992) argues to be a variable. See the following examples:

- (6) a. Elephants run fast. (elephants universal)
 b. John pets elephants. (elephants existential)
 c. John likes elephants. (elephants universal)

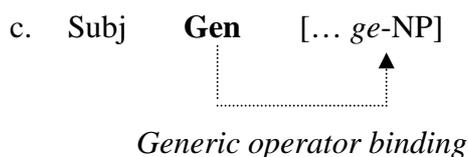
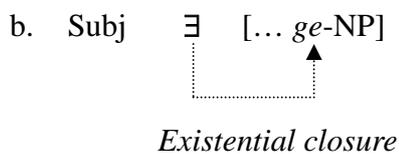
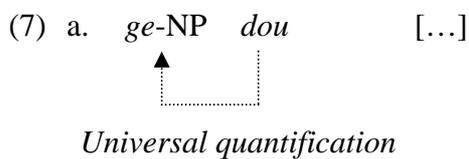
A comparison of (5) and (6) suggests the *ge*-NP is actually a variable, on a par with the bare plural in English. Thus the determiner *ge* doesn’t really have quantificational force of its own.

Chao (1968) glosses *ge* as ‘numerous’ rather than ‘each’ or ‘every’; perhaps Chao (1968) has sensed the fact that the *ge*-NP may assume different quantificational interpretations in different contexts. Suppose that *ge* is actually a plurality marker, very much like those determiners denoting plurality, such as *naxie* ‘those’.³ Suppose

³ This also accounts for the fact that *ge* doesn’t take numerals, unlike other determiners (see note 1). Determiners such as *naxie* ‘those’ don’t take numerals either:

- (i) Naxie (*san-ge) xuesheng hui jia le.
 those three-CL student return home PRT
 ‘Those (three) students went home.’

furthermore that the *ge*-NP denotes a *group of individuals* that the NP denotes. These assumptions conjointly account for the fact that the *ge*-DP behaves like a variable. We can thus follow Heim (1982) and Diesing (1992) and assume that existential closure applies at VP and binds the indefinite inside the predicate (also see Tsai 1994). Then the pattern in (5) falls out straightforwardly. In (5a) the *ge*-NP is universal because of the universal quantificational adverb *dou* ‘all’; in (5b) the *ge*-NP is existential because, being in the object position, it is existentially bound; in (5c) the *ge*-NP is universal, because, according to Chierchia (1995), stative predicates are inherently generic, and the *ge*-NP is in the scope of the generic operator, hence universal. The relevant points are shown in the following diagrams.



In summary, the determiner *ge* is a plurality marker, and consequently the *ge*-NP behaves on a par with the bare plural in English. Its different interpretations arise from different binders in different syntactic positions. The determiner *ge* doesn’t have inherent quantificational force.

4. Classifiers and Existential Import

Now we turn to the question of the classifiers. It was pointed out above that the classifiers that *ge* permits are those which denote collections, groups, kinds, social institutions, and abstract entities. The “abstractness” of those classifiers can be demonstrated as follows. Some classifier-N sequences are ambiguous in permitting the “concrete” reading (denoting concrete objects) and the “abstract” reading (denoting abstract entities). For these classifiers, *ge* favors the abstract reading but not the concrete reading. See the following examples.

- (8) a. X-suo xuexiao (X a determiner or determiner-numeral sequence)
-CL school
1. School as an organization
2. School as a concrete object (building(s))
- b. Ge-suo xuexiao dou kangyi yusuan shanjian.
GE-CL school all protest budget cut
'All the schools protest against budget cut.'
- c. ??Ge-suo xuexiao dou bei jianzhu gongsi chai le.
GE-CL school all PASS construction company destruct PRT
'All the schools are torn down by the construction company.'
- d. na-san-suo xuexiao dou bei jianzhu gongsi chai le.
that-three-CL school all PASS construction company destruct PRT
'All those three schools are torn down by the construction company.'

(8a) shows that the classifier *suo*, when applied to the notion ‘school’, can denote an abstract organization or a concrete object (perhaps a building or a complex of buildings). In (8b), *xuexiao* ‘school’ is presupposed as abstract entities (organizations) due to the semantics of the whole sentence (only organizations, but not buildings, can protest); in this case the use of *ge* in *ge-suo xuexiao* ‘GE-school’ is acceptable. In (8c), the meaning of the sentence entails that *xuexiao* ‘school’ denotes a concrete object (to be torn down by a construction company); in this case, the use of *ge* is very awkward. (8d) shows that if *ge-suo* is replaced by *na-san-suo* ‘those three...’, the sentence becomes acceptable; this indicates that the classifier *suo* indeed can denote concrete objects. The contrast between (8b) and (8c), therefore, shows that the determiner *ge*

prefers a classifier that denotes abstract entities but not concrete objects.

We provide another example. See the sentences below.

- (9) a. X-zhang zhuozi (X a determiner or a determiner-numeral sequence)
 -CL table
 1. Table as a unit for guest-hosting
 2. Table as a concrete object
- b. Ge-zhang zhuozi dou you san-ge ren fushi.
 GE-CL table all have three-CL person serve
 ‘Each table has three persons on service.’
- c. ??Ge-zhang zhuozi dou shang-le yi-ceng xin youqi.
 GE-CL table all paint-PERF one-layer new paint
 ‘Each table is painted with a new coating of paint.’

Just like the case of *xuexiao* ‘school’, *zhuozi* ‘table’ can occur with *ge* (along with the occurrence of the classifier *zhang*) if it is construed as a unit for guest-hosting, but not otherwise. Below is one more example that exhibits the same effect.

- (10) a. X-dong dalou (X a determiner or a determiner-numeral sequence)
 -CL building
 1. Building as a unit for residence/business
 2. Building as a concrete object
- b. Ge-dong dalou dou yanfang kongbu-fenzi gongji.
 GE-CL building all cautious terrorist attack
 ‘All the buildings are cautious for the terrorists’ attacks.’
- c. ??Ge-dong dalou dou xiang ge hen jin
 GE-CL building all each-other separate very close
 ‘All the buildings are separated from each other closely.’

These examples indicate that the classifiers that *ge* can take must, in some sense, denote abstract entities.⁴

⁴ One may wonder whether it is the classifier (*suo*, *zhang*, and *dong*) or the NP itself that gives rise to the abstract-concrete contrasts. Though it is not easy to get a clear

But a question emerges: How do we define “abstractness”? And, in what sense are those classifiers, such as *zhong* ‘kind’, “abstract”? A possibility is as follows. When one says that X is abstract, the commonsense intuition is that X doesn’t have (or doesn’t necessarily have) a spatio-temporal realization in the world. Love and hatred are abstract entities since one finds no individuals in the world that can be labeled ‘love’ and ‘hatred’. They are of notional existence. Take a different example. Suppose there is a kind of animal called *Xaurcius*. This kind of animals may have living instances in the real world, or it may not; but no matter what, the *existence* of the kind *Xaurcius* is no question.⁵ Thus the existence or such higher-order entities as

answer by just observing (8-10), evidence indicates that it is the classifier that matters, not the NP. The classifier *ge* (different from the determiner *ge*) is a neutral classifier in Mandarin Chinese, and it can replace many classifiers with specific meanings. The determiner *ge* can take the classifier *ge*, even though a different classifier may cause ungrammaticality with exactly the same NP. Look at the following examples:

- | | | | | | |
|--------|-----------|------------|-----|-------|------------|
| (i) a. | *ge-tai | diannao | a’. | ge-ge | diannao |
| | GE-CL | computer | | GE-CL | computer |
| b. | *ge-zhang | yizi | b’. | ge-ge | yizi |
| | GE-CL | chair | | GE-CL | chair |
| c. | *ge-zuo | maikefeng | c’. | ge-ge | maikefeng |
| | GE-CL | microphone | | GE-CL | microphone |

These examples show that the determiner *ge* is sensitive to the classifier only, not the NP.

⁵ Consider the following two sentences:

- (i) a. Dinosaurs are animals.
 b. Dinosaurs were animals.

Though dinosaurs have been extinct, it doesn’t seem felicitous to say (ib) for dinosaurs *as a kind*. (ia), a present-tensed sentence, appears to be more felicitous. This may be evidence for the claim that a kind exists even though all its realizations have been extinct.

One may object to this view by pointing out that (iia) cannot be felicitous in the world now, though (iib) is.

- (ii) a. Dinosaurs are everywhere.
 b. Dinosaurs were everywhere.

The difference between (ia-b) and (iia-b) depends on the nature of the predicates. Carlson (1977) points out that predicates can be predicated of kinds, objects, or stages. Being animals can be understood as a kind-level predicate, but being everywhere is more likely an object-level predicate. Thus these two predicates are predicated of

kinds and the existence of their instances are totally different matters. It is likely, then, that the classifiers that *ge* can take are those with such higher-order properties. The entities that they denote don't have to have *existential import*.

A striking phenomenon renders support to this conjecture. Look at the following examples.

- (11) a. ??Ni shuo de na-zhi bi bu cunzai.
 you say MOD that-CL pen not exist
 'The pen that you mentioned doesn't exist.'
- b. ??Ni shuo de na-duo hua bu cunzai.
 you say MOD that-CL flower not exist
 'The flower that you mentioned doesn't exist.'
- c. ??Ni shuo de na-tiao yu bu cunzai.
 you say MOD that-CL fish not exist
 'The fish that you mentioned doesn't exist.'
- d. ??Ni shuo de na-ben shu bu cunzai.
 you say MOD that-CL book not exist
 'The book that you mentioned doesn't exist.'
- e. ??Ni shuo de na-bei shui bu cunzai.
 you say MOD that-CL water not exist
 'The cup of water that you mentioned doesn't exist.'
- (12) a. Ni shuo de na-zhong dongwu bu cunzai.
 you say MOD that-kind animal not exist
 'The kind of animal that you mentioned doesn't exist.'
- b. Ni shuo de na-men xuewun bu cunzai.
 you say MOD that-entry scholarship not exist
 'The scholarship that you mentioned doesn't exist.'
- c. Ni shuo de na-dong dalou bu cunzai.
 you say MOD that-CL building not exist
 'The building that you mentioned doesn't exist.'
- d. Ni shuo de na-suo xuexiao bu cunzai.
 you say MOD that-CL school not exist

entities of different orders.

‘The school that you mentioned doesn’t exist.’

- e. Ni shuo de na-zu wanju bu cunzai.
you say MOD that-set toy not exist

‘The set of toy that you mentioned doesn’t exist.’

(11a-e) are examples for classifiers that *ge* cannot take, and (12a-e), classifiers that *ge* can take. It turns out that the denial of existence in (11a-e) sounds very awkward, as if we are to deny the existence of something which is *presupposed to exist* in the first place. Such awkwardness doesn’t arise in (12a-e). The contrast between (11) and (12), therefore, suggests that the classifiers that *ge* can take are those that don’t have *existential import* in their semantics.

It thus seems that the classifiers in Mandarin Chinese can be distinguished into two types, those with existential import and those without. Much literature has been devoted to the study of classifiers and their semantic/cognitive basis (see, among many others, Muromatsu (1995), Chierchia (1998), Huang and Ahrens (2003)), but to my knowledge, none of the earlier works has noted the distinction between classifiers with existential import and those without. This distinction, therefore, is a novel discovery.

In summary, the determiner *ge* doesn’t take all classifiers that other determiners can take because it requires the classifiers to be of no existential import. As to why, we will leave it to future research.

5. *Mei* and the Way It Is Licensed

In the previous sections we introduced two core properties of the determiner *ge* and their accounts. It was shown that the *ge*-NP is in fact a variable, and that *ge* requires the classifier it takes to be of no existential import. In section 2 we showed that *mei* ‘every’ takes all sorts of classifiers; this indicates that *mei* doesn’t set any restriction on the classifier it takes as *ge* does. A question is: does *mei* exhibit variable-like properties as well?

Consider the following examples of the *mei*-NP:

- (13) a. Mei-zhong lanhua dou you wu-pian yezi.
every-kind orchid all have five-CL leaf
‘Every kind of orchid has five leaves.’

- b. ??Laowang zai hou-yuan-li zhong-le mei-zhong lanhua.
 Laowang at back-yard-in plant-PERF every-kind orchid
 ‘Laowang grows every kind of orchid in his backyard.’
- c. Laowang xihuan mei-zhong lanhua.
 Laowang like every-kind orchid
 ‘Laowang likes every kind of orchid.’

In (13a) and (13c), the *mei*-NP *mei-zhong dongwu* ‘every kind of animal’ is universal; this is the same as the case of the *ge*-NP. But (13b), where the *mei*-NP occurs as the object of an action sentence, is not quite acceptable. This is unlike the case of the *ge*-NP, which receives an existential reading in the same syntactic position. What is the problem with the *mei*-NP in object position?

The problem with (13b) is that the object *mei*-NP seems to lack restriction. (13b) can be improved by further modification.

- (14) Laowang zai hou-yuan-li zhong-le Taiwan-chan de
 Laowang at back-yard-in plant-PERF Taiwan-origin MOD
 mei-zhong lanhua.
 every-kind orchid
 ‘Laowang grows every kind of orchid indigenous of Taiwan in his backyard.’

In general, a “bare” *mei*-NP is not very good in object position; some modification must be provided. Below is one more examples.

- (15) a. *Laowang jingli-le mei-zhong kunnan
 Laowang experience-PERF every-kind difficulty
 cai you jintian-de chengjiu.
 so have today-MOD achievement
 ‘Laowang went through every kind of difficulty to achieve the success today.’
- b. Laowang jingli-le ni neng xiangxiang de
 Laowang experience-PERF you can imagine MOD

mei-zhong kunnan cai you jintian-de chengjiu.
 every-kind difficulty so have today-MOD achievement
 'Laowang went through every kind of difficulty that you can imagine to
 achieve the success today.'

The above examples indicate that the quantificational determiner *mei*, in fact, needs some sort of licensing. In object position a specific modification provides such licensing.

The modification of the *mei*-NP in (14) and (15b) seems to provide a *generator set* for *mei* quantification.⁶ A strong quantifier needs a generator set based on which to perform quantification. But it seems that for *mei* 'every' in Mandarin Chinese, no generator set is presupposed; the generator set must be provided independently. This is what the modification expression in (14) and (15b) does. Suppose the determiner *mei* 'every' has a logical representation roughly as follows (the VP part is omitted):

⁶ A generator set is the set of individuals that is quantified over. For example, the sentence *Every book is expensive* presupposes a set of books as the generator set.

Notice incidentally that the English counterparts of (13b) and (15) are not very good either:

- (i) a. ?John grows every kind of orchid in his backyard.
- b. ?John went through every kind of difficulty for success.

But it seems that the degradation of (ia) and (ib) is much milder than the Mandarin examples (13b) and (15). Indeed context seems to play a role here. Though the *mei*-NP is generally bad in object position of an action sentence in Mandarin Chinese, sometimes the context can fill the required information and help to fix the domain of quantification. Look at the following example:

- (ii) ?Zhangsan mai-le mei-ben shu.
 Zhangsan buy-PERF every-CL book
 'Zhangsan bought every book.'

(ii) is only mildly deviant compared with (13b) and (15), and the reason is that a context – the most natural one being the presence of a book list – may easily fill in to help fix the generator set. Notice that the English counterpart of (ii) (see the gloss) is completely acceptable. Thus, though the nature of predicates matters to some extent, a systematic contrast between Mandarin Chinese and English does exist. For English *every*, a generator set is always presupposed, though some of such sets go beyond the limit of the commonsense knowledge and hence yield mild semantic deviance, as in (ia-b). For the Mandarin *mei* 'every', some sort of restriction/modification is always in need for the fixing of the generator set.

$$(16) \quad \| mei \| = \lambda P \lambda E \forall y [Q(X) \wedge (y \in X \leftrightarrow P(y))]$$

What is special in (16) is that X, a free variable representing the domain of quantification, is restricted by a predicate E. (14) can then be derived in the following way:

- (17) a. *Mei* is combined with the classifier *zhong* ‘kind’ and the NP *lanhua* ‘orchid’.
 $\lambda E \forall y [Q(X) \wedge (y \in X \leftrightarrow \mathbf{kind-of-orchid}(y))]$.
- b. The modification expression comes into play.
 $\forall y [\mathbf{Indigenous-to-Taiwan}(X) \wedge (y \in X \leftrightarrow \mathbf{kind-of-orchid}(y))]$.
- c. Existential closure (unselectively) closes X.
 $\exists X \forall y [\mathbf{Indigenous-to-Taiwan}(X) \wedge (y \in X \leftrightarrow \mathbf{kind-of-orchid}(y))]$.

(17a-c) is a rough sketch and only serves to illustrate the points. (The logical representation of *mei* ‘every’ will be further refined later.) What is essential is that, first, the predicate variable E must be instantiated, and, second, the domain variable X is closed off by the default operation of existential closure applied at VP.

(13a) and (13c) can also be accounted for. In (13a), the *mei*-NP occurs as the subject of the sentence, which also contains *dou* ‘all’. The variables E and X presumably are fixed by *dou* ‘all’ (see next section). In (13c) the *mei*-NP occurs as the object of a stative verb, where E and X are fixed by the generic operator Gen yielding the universal reading.⁷

Notice that, if the characterization of *mei* provided here is on the right track, *mei* indeed has “variable-like” properties, specifically the presence of variables E and X in (16) that help to determine the generator set. This part is similar to the determiner *ge*. But of course the two determiners diverge in other aspects. *Ge* has a full array of variable properties, but *mei* doesn’t; in particular, *ge* doesn’t have inherent quantificational force, but *mei* has inherent universal force. This is the most important

⁷ Generic sentences often exhibit quantification over situations. Consider the sentence *John smokes*. This sentence doesn’t mean that John smokes all the time; more plausibly, it means that in all context-determined situations, John smokes. Thus the variables E can be filled by the context-determined situation. The existence of the set of context-determined situations also provides the required existential closure for X.

distinction between the two determiners.

There have been debates on whether the determiner *mei* ‘every’ has inherent quantificational force. Lin (1998) suggests that *mei* doesn’t really have inherent quantificational force, and that *mei* only provides a grouping function, as follows (Lin 1998: 238):

$$(18) \quad \| mei \| = \text{that function } f \text{ such that for all } P \in D_{\langle e, t \rangle}, f(P) = \cup \| P \|$$

On the other hand, Yang (2001) argues that *mei* is a genuine quantifier with inherent universal force, as follows (Yang 2001: 93):

$$(19) \quad \| mei \text{ ‘every’} \| = \lambda P \lambda Q [\exists X (\forall x (x \in X \leftrightarrow P(x)) \wedge Q(X))]$$

To Lin (1998), the *mei*-NP is not quantificational; the real universal quantifier is *dou* ‘all’. In fact, Lin (1998) proposes that a *mei*-NP is semantically equivalent to a definite description. The importance of *dou* ‘all’ for the *mei*-NP can be illustrated by the following examples.

- (20) a. *Mei-zhong dongwu yangyu xia-yi-dai.
 every-kind animal breed next-one-generation
 ‘(Intended) Every kind of animal breeds younger generations.’
- b. Mei-zhong dongwu dou yangyu xia-yi-dai.
 every-kind animal all breed next-one-generation
 ‘Every kind of animal breeds younger generations.’

(20a) and (20b) differ only in the presence of *dou* in the latter, and the presence of *dou*, as shown in these two examples, determines the grammaticality of the sentence.

Yang (2001) points out a number of problems of Lin’s (1998) view on *mei*, which we do not repeat here. Here we can add two more problems. First, if a *mei*-NP is equivalent to a definite description, it is not clear why the presence of *dou* is obligatory in examples like (20b) – if the subject of (20a) is replaced by a definite description, the sentence will be perfectly grammatical:

- (21) Na-ji-zhong dongwu yangyu xia-yi-dai.
 that-several-kind animal breed next-one-generation
 ‘Those several kinds of animal breed younger generations.’

In other words, the dependency between the *mei*-NP and *dou* in examples like (20b) cannot be captured in Lin’s (1998) theory.⁸ Second, there are cases in which a subject *mei*-NP occurs without the “support” of *dou* while retaining the universal reading.

Look at the following examples (see T.-H. Lin 1998):

- (22) a. Mei-ge ren duan qiang!
 Every-CL person uphold rifle
 ‘Everyone uphold the rifle!’
- b. Mei-ge ren gei wo yi-bai kuaiqian!
 Every-CL person give me one-hundred dollar
 ‘Everyone give me a hundred bucks!’

(22a) and (22b) are imperative sentences, and, typically, *dou* doesn’t need to occur in this kind of sentences. T.-H. Lin (1998) suggests that this is because the immediate speech context provides the required restriction for the *mei*-NP. Thus it is not really true that *mei* lacks inherent quantificational force but has to count on *dou* ‘all’. What is more important appears to be the fixing of the domain of quantification of *mei*, as pointed out above. Based on all these considerations, we concur with Yang (2001) that the determiner *mei* has inherent universal quantificational force.

6. DOU QUANTIFICATION

We suggested above that the *mei*-NP needs licensing. In object position the *mei*-NP can be licensed by a modification expression. But this strategy doesn’t work for the

⁸ Lin (1998) proposes to adopt Beghelli and Stowell’s (1994, 1997) theory and assume that *dou* ‘all’ is the head of the functional projection Distributive Phrase (DistP), and that a plural nominal can optionally take the strong feature of quantificational or distributive feature and then move to Spec of DistP for checking. If the *mei*-NP is just a group nominal, it is not clear why the option of not taking such strong feature is not available to the *mei*-NP, as with the case of the definite description.

mei-NP in subject position. See the following examples:

- (23) a. *Mei-zhong lanhua you wu-pian yezi.
 every-kind orchid have five-CL leaf
 ‘Every kind of orchid has five leaves.’
- b. *Taiwan-chan de mei-zhong lanhua you wu-pian yezi.
 Taiwan-origin MOD every-kind orchid have five-CL leaf
 ‘Every kind of orchid has five leaves.’

On the other hand, the occurrence of *dou* ‘all’ can make (23a) and (23b) grammatical.

Remember that the *mei*-NP has inherent universal quantificational force, thus the dependency between *dou* and the *mei*-NP cannot arise from lack of quantificational force in the latter. Also remember that the determiner *mei* needs to have its generator set fixed. What is causing problems, is the role of *dou* in fixing the generator set of *mei*.

Many researchers consider *dou* a distributivity operator (e.g. Li 1997, Lin 1998, Yang 2001). According to this view, *dou* attributes a property to each member of a given set. See the following examples.

- (24) a. Tamen mai-le yi-ben shu.
 they buy-PERF one-CL book
 ‘They bought a book [collectively].’
- b. Tamen dou mai-le yi-ben shu.
 they all buy-PERF one-CL book
 ‘Everyone of them bought a book.’

The most sophisticated definition of *dou* involves the notion “covers” (Lin 1998); see below (adapted from Yang 2001: 100):

$$(25) \quad \| dou \| = \lambda P [\forall y ((y \in \|cov\| \wedge \|cov\| \subseteq X) \rightarrow P(y))] \quad (X \text{ a free variable})$$

Notice that (25) contains a free variable X, which is the domain of quantification if the subject of the sentence is a quantifier, such as the *mei* NP. But this doesn’t seem right,

since, as we pointed out, the *mei*-NP needs an independent source for the fixing of its domain of quantification. (25) would work in such a way that *dou* receives a fixing of domain from the *mei*-NP, contrary to what we expect. The situation should be the other way around: namely, the *mei*-NP receives a fixing of domain of quantification.

Also notice the following two complications. First, *mei* does not really need *dou* for support; other distributive adverbs may do the work as well. See the examples below.

- (26) a. Mei-ge xuesheng dou mai-le laing-ben shu.
 every-CL student all buy-PERF two-CL book
 ‘Every student bought two books.’
- b. Mei-ge xuesheng ge mai-le laing-ben shu.
 every-CL student each buy-PERF two-CL book
 ‘Each student bought two books.’
- c. Mei-ge xuesheng fenbie mai-le laing-ben shu.
 every-CL student respectively buy-PERF two-CL book
 ‘Every student bought two books respectively.’

The (b) and (c) examples above show that *ge* ‘each’ (the adverbial *ge* of (1a) type) and *fenbie* ‘respectively’ can support the *mei*-NP. *Dou* doesn’t really have to occur. This is something that needs an explanation. Second, not all *mei*-NPs need a supporting adverbial. Li (1997) notices that when the NP is a temporal expression, *dou* (and other distributive adverbs) doesn’t need to occur. This is in sharp contrast with other expressions, such as the location expression. Compare the following two examples.

- (27) a. Zhangsan mei-tian mai liang-ben shu.
 Zhangsan every-day buy two-CL book
 ‘Zhangsan buys two books everyday.’
- b. Zhangsan zai mei-ge chengshi *(dou) mai liang-ben shu.
 Zhangsan at every-CL city all buy two-CL book
 ‘Zhangsan buys two books in every city.’

This is another thing that needs an explanation.

Considering all that is presented above, what *mei* needs for licensing appears to be distributivity. But this doesn't seem right, because distributivity is in no way essential to the semantics of the *mei*-NP. We believe that the answer for this questions lies in an essential property of a distributivity relation – its domain of distribution. Choe (1987) points out that a distributivity relation involves two components: the distributed share and the sorting key (also see Partee 1995). The distributed share amounts to the domain of distribution. A well-defined distributivity relation depends on a well-defined domain of distribution. Lin (2004) shows that a distributivity relation whose domain of distribution cannot be well-defined will lead to crash of the semantics of the sentence. See the following example:

- (28) **Yiban-de ren ge / fenbie zhichi mou-yi-ge qiu-dui.*
 average-MOD person each respectively support some-one-CL ball-team
 '(Lit.) The average person supports some baseball team each / respectively.'

Yiban-de ren 'the average person' doesn't have a concrete denotation, and thus it doesn't qualify as a legitimate domain of distribution. This is the reason for the ungrammaticality of (28).

We may thus suppose that what *mei* needs for licensing is a well-defined domain. This is also the proposal that we made earlier regarding *mei*, namely, that it needs to have its generator set fixed. The next task is to show that *dou* provides exactly this function for *mei*. Two pieces of evidence indicate that this is indeed the case.

First, as observed by Partee (1988) and many others (see Cohen 2001 in particular), the quantificational word *many* is ambiguous: for an expression *many(P)(Q)*, *many* can quantify over P against the total number of P, and it can also quantify over P against the total number of Q.⁹ See the following example:

- (29) Many cooks apply.
 1. Many cooks out of the total number of cooks apply.
 2. Many cooks apply out of the total number of applicants.

⁹ Cohen (2001) distinguishes three possible readings for *many(P)(Q)*: the cardinal reading, the absolute proportional reading, and the relative proportional reading. The details of this three-way distinction do not concern us here.

The Mandarin Chinese equivalent *henduo* also exhibits such ambiguity too:

- (30) Henduo chushi canjia huiyi.
many cook participate meeting
'Many cooks participate in the meeting'
1. Many cooks out of the total number of cooks participate in the meeting.
2. Many cooks participate in the meeting out of the total number of participants.

Interestingly, if *dou* is inserted into (30), the sentence can only assume construal 1, not construal 2:

- (31) Henduo chushi dou canjia huiyi.
many cook all participate meeting
'Many cooks [out of the total number of cooks] participate in the meeting'

To my knowledge, this function of *dou* has never been observed. In addition to the distributivity function, it is clear that *dou* provides a reference set to the quantificational subject against which *henduo* 'many' performs quantification.¹⁰ Thus *dou* has the function to restrict the domain of the first argument of a quantificational determiner. It is likely that this function of *dou* satisfy the need of *mei* to have its generator set fixed.

Second, the presence of *dou* in a generic sentence causes a change in the meaning of the sentence. There are several ways to form a generic sentence in Mandarin Chinese (see Hsieh 2004). Now, compare the following two sentences.

- (32)a. Laohu chi ren.
tiger eat human
'tigers eat human beings.'

¹⁰ See Lin (1998) for the semantics of *henduo* 'many' in Mandarin Chinese. But Lin (1998) doesn't discuss the question of the ambiguity of *henduo* 'many'.

- b. Laohu dou chi ren.
 tiger all eat human
 ‘All tigers eat human beings’

The subject *laohu* ‘tigers’ in (33a) denotes a kind (see Carlson 1977 and Cheng 1991), and the sentence asserts that the kind *laohu* ‘tigers’ has the property or propensity of eating human beings. In (32b), on the other hand, the subject *laohu* ‘tiger’, being quantified by *dou*, doesn’t denote a kind but a set of tigers, each of which is ascribed the property or propensity of eating human beings. The difference between (32a) and (32b) is as follows. (32b) can be uttered only if there is a specific set of tigers that is being talked about; (32a) is not subject to this restriction. In other words, (32b) amounts to a collection of assertions that, presuming there are n_m tigers, tiger n_1 eats human beings, and tiger n_2 eats human beings, and tiger n_3 eats human beings ... and tiger n_{m-1} eats human beings, and tiger n_m eats human beings. (32a) doesn’t have such entailment. This difference can be seen clearly in the following case. Krifka *et al* (1995) present an interesting observation. *Birds lay eggs* is a legitimate generic sentence, ascribing the property of laying eggs to the kind birds. But notice that only female birds lay eggs, and furthermore, not all female eggs lay eggs (young birds don’t, for example). Thus only less than half of the total number of birds have the property *lay eggs*, though this, on our linguistic judgment, doesn’t affect the legitimacy of the generic sentence *Birds lay eggs*. Now consider the following two Mandarin Chinese sentences.¹¹

- (33)a. Niao hui xia dan.
 bird will lay egg
 ‘Birds lay eggs.’
- b. Niao dou hui xia dan.
 bird all will lay egg
 ‘All birds lay eggs.’

¹¹ See Hsieh (2004) for a thorough discussion on the generic sentences in Mandarin Chinese. The distinction between generic sentences with the modal *hui* ‘will’, as (33a), and those without *hui* ‘will’, as (32a), does not concern us here. See Hsieh (2004) for more details.

(33a) holds even if less than half of the birds in the world lay eggs, but (33b) does not. For (33b) to be true, each and every single bird in the world must lay eggs. In other words, for (33b) (and (32b)) to be a sensible generic sentence, a specific domain must be specified. The difference between (32a), (33a) and (32b), (33b), once again, indicates *dou* has the function to restrict the domain of distribution.

As to the nature of the restriction function of *dou*, a phenomenon observed above provides some insights. Remember that not all kinds of *mei*-NP need *dou*; if the NP is a temporal expression, *dou* doesn't have to occur. The example is repeated below (= (27a)):

- (34) Zhangsan mei-tian mai liang-ben shu.
 Zhangsan every-day buy two-CL book
 'Zhangsan buys two books everyday.'

This seems to suggest that the restriction that *dou* provides is of *temporal nature* – the temporal nominal *tian* 'day' provides exactly the kind of restriction that *mei* needs for its domain, thus *dou* doesn't need to occur in (34); on the other hand, other kinds of NP, such as the location expression, provides no such information, thus the presence of *dou* is obligatory (see (27b)).

This consideration leads to the formulation of the restriction function of *dou* in terms of *event*. The notion of event is often associated with temporality, as is clear in the discussion of event types in Vandler (1967) (also see Hinrichs's (1985) discussion of *Aktionsarten*). Furthermore, Kratzer (1995) links the Davidsonian event argument directly to the tense of the sentence. Suppose we take a temporal-based view of event and understand an event as an interval with a special status (e.g. in which a relation among certain individuals hold).¹² Then what *mei* needs is a restriction on the event argument. We therefore reformulate *mei* as follows.

- (35) || *mei* || = $\lambda P\lambda Q\exists X [E(e) \wedge \forall x(x \in X \leftrightarrow P(x)) \wedge Q(X)]$

(35) retains the essentials of (16). Here a predicate E restricts the event argument *e*,

¹² Montague (1974) defines events as a property of time, namely, a function from time to truth value. See Higginbotham (2000) for relevant discussion.

providing a specification to fix the domain of quantification.¹³

Now we turn to *dou*. *Dou* must have two functions in addition to the distributive function: it provides a value for E, and it closes *e*. We argued above that *dou* has these functions. We thus assume that *dou* has the following representation, adopting Lasnik's (1995) theory of distributivity based on part-whole relation of events.

$$(36) \quad \| dou \| = \lambda P \lambda X \exists e [\forall y ((y \in \| cov \| \wedge \| cov \| \subseteq X) \rightarrow \exists e' (e' \leq e \wedge \mathbf{Th}(e', y) \wedge P(y)))]$$

In (36), *dou* provides an existentially closed event argument, and maps the event argument to a series of sub-events. To link the sub-events and the elements in the domain of distribution, a thematic-role predicate **Th** (Parsons 1990) is introduced into the representation.

(38) illustrates the way (37) is derived (again, the classifier and other complications are ignored).

¹³ Unlike in (16), E is posited in (35) as a free variable instead of a λ -predicate. Consider the following examples:

- (i) a. Laowang zai hou-yuan zhong-le Taiwan-chan-de.
 Laowang at back-yard grow-PERF Taiwan-indigenous-MOD
 mei-zhong lanhua
 every-kind orchid
 'Laowang grows every kind of orchid indigenous to Taiwan in his backyard.'
- b. Laowang zai hou-yuan zhong-le mei-zhong
 Laowang at back-yard grow-PERF every-kind
 Taiwan-chan-de. lanhua
 Taiwan-indigenous-MOD orchid
 'Laowang grows every kind of orchid indigenous to Taiwan in his backyard.'

(ia) has the order Modification-*mei*-NP, while (ib) has the order *mei*-Modification-NP. Thus it doesn't seem appropriate to locate E in a specific and fixed position in the logical representation. In fact, E appears to be default in some sense; namely, as long as there is some kind of restriction (by whatever means), the *mei*-NP is fine. So we leave E free to be implemented by post-compositional operations. Incidentally, if *mei* has inherent quantificational force, it has to undergo QR at LF, or the predicate Q cannot be λ -converted. We will not go into the relevant questions, as many complications are involved.

(37) Mei-zhong lanhua dou wen-qilai hen xiang
 every-kind orchid all smell-up very fragrant
 ‘Every kind of orchid smells good.’

- (38) a. || ‘every kind of orchid’ || =
 $\lambda Q \exists X [E(e) \wedge \forall x ((x \in X \leftrightarrow \mathbf{kind-of-orchid}(x)) \wedge Q(X))]$
- b. || ‘smells good’ || =
 $\lambda X \exists e [\forall y ((y \in \|\mathbf{cov}\| \wedge \|\mathbf{cov}\| \subseteq X) \rightarrow \exists e' (e' \leq e \wedge \mathbf{Theme}(e', y) \wedge \mathbf{smell-good}(y)))]$
- c. || ‘every kind of orchid smells good’ || =
 $\exists X [E(e) \wedge \forall x ((x \in X \leftrightarrow \mathbf{kind-of-orchid}(x)) \wedge \exists e' [\forall y ((y \in \|\mathbf{cov}\| \wedge \|\mathbf{cov}\| \subseteq X) \rightarrow \exists e'' (e'' \leq e' \wedge \mathbf{Theme}(e'', y) \wedge \mathbf{smell-good}(y))])])]$

To the point that (38c) is reached, E and e are still left free. Suppose that at this point E is replaced by whatever situation specification *dou* brings in – call it S^{14} – and e is closed due to the function of *dou* as well, perhaps by raising of the existential quantifier.

¹⁴ It has been widely noticed that *dou* can quantify over “events” (Li 1997 and Huang 1994). That is, when there is no suitable plural nominal to quantify over, *dou* is understood as quantifying over a set of (untold) situations or events. In fact other distributive adverbials have this property as well. Look at the following examples:

- (i) a. Laowang dou mai san-ben shu.
 Laowang all buy three-CL book
 ‘Laowang always buys three books [in the specific set of situations].’
- b. Laowang fenbie mai-le san-ben shu.
 Laowang respectively buy-PERF three-CL book
 ‘Laowang bought three books [in each of the specified situations].’
- c. Laowang ge mai-le san-ben shu.
 Laowang each buy-PERF three-CL book
 ‘Laowang bought three books [in each of the specified situations].’

Notice that, in (ia-c), the distributive adverbials are understood as quantifying over a specific set of situations or events, even though the set of situations/events are not overtly represented. Intuitively, this property of the distributive adverbials has a direct bearing on their distributivity function, though it is not easy to see exactly how that property can be characterized. But it doesn’t seem unreasonable to assume that this property of the distributive adverbials in (ia-c) has a bearing on the requirement for a well-defined domain of distribution with these adverbials. That is, these distributive adverbials have the ability to induce situations/events as a default means for their quantification and that contributes to the establishment of a well-defined domain of distribution.

Then we obtain (39).

$$(39) \quad \exists X \exists e [\mathbf{S}(e) \wedge \forall x ((x \in X \leftrightarrow \mathbf{kind-of-orchid}(x)) \wedge [\forall y ((y \in \|\mathbf{cov}\| \wedge \|\mathbf{cov}\| \subseteq X) \rightarrow \exists e' (e' \leq e \wedge \mathbf{Theme}(e', y) \wedge \mathbf{smell-good}(y)))])]]$$

If the NP of the *mei*-NP is a temporal expression, at the point where *mei* is composed with the NP (cf. (38a)), E is given; also, being temporal in nature, *e* can be closed due to the presence of the temporal expression.

7. Conclusion

In this paper we discuss the quantificational properties of the determiner *ge*, and also the related questions on the determiner *mei* and the distributive adverb *dou*. It is shown that *ge* doesn't really have inherent quantificational force, and, as a result, it behaves like a variable. On the other hand, *mei* has inherent quantificational force, though it also has variable-like properties. This paper also examines the functions of *dou*, focusing on its "support" to *mei*. It is argued that what *dou* really does is provide a fixed reference set as a restriction to the domain of distribution. These properties conjointly explain the dependency between *mei* and *dou*.

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