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# GENERAL NUMBER AND THE SEMANTICS AND PRAGMATICS OF INDEFINITE BARE NOUNS IN MANDARIN CHINESE

KEYWORDS: number, bare nouns, indefinites, scope, scalar implicature, Mandarin Chinese

## 1. INTRODUCTION

Like many other languages, Mandarin Chinese has noun phrases consisting of just a BARE NOUN without any functional elements such as determiners, classifiers, or number morphemes:<sup>1</sup>

- (1) Zuotian wo mai le **shu**.  
yesterday I buy ASP book  
‘Yesterday, I bought one or more books.’

One striking property of bare nouns is that they are neither singular nor plural, but somehow “neutral” or “unspecified” for number, as suggested by the somewhat cumbersome English translation ‘one or more books’. Following Corbett (2000) we will say that bare nouns in Mandarin have GENERAL NUMBER.

In this paper we investigate semantic and pragmatic properties of bare nouns in Mandarin Chinese, restricting ourselves to bare nouns with an existential interpretation, as in (1). In particular, we will address the question how indefinite bare nouns differ from what we will call INDEFINITE FULL DPS, such as English *a book* and *some books*, or their counterparts in Mandarin *(yi) ben shu* ‘a/one book’ and *yixie shu* ‘some books’:

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<sup>1</sup> Bare nouns may have modifiers such as adjectives or relative clauses, but we will not discuss these in this paper.

- (2) Zuotian wo mai le **(yi) ben shu**.  
 yesterday I buy ASP one CL book.  
 ‘Yesterday, I bought a/one book.’
- (3) Zuotian, wo mai le **yixie shu**.  
 yesterday, I buy ASP some book.  
 ‘Yesterday, I bought some books.’

In contrast to bare nouns, the indefinite full DPs in (2) and (3) do not have general number. As we will show below *(yi) ben shu* ‘a/one book’ is (semantically) singular, and *yixie shu* ‘some books’ is semantically plural.

The indefinite singular in (2) consists of the numeral *yi* ‘one’ followed by a classifier followed by the noun. This DP is the functional equivalent of *one book* or *a book* in English. The sequence *yi ben* ‘one + classifier’ corresponds to the English *one* when *yi* is stressed, and to the English determiner *a(n)* when *yi* is unstressed. When unstressed, the numeral *yi* ‘one’ can be omitted.<sup>2</sup> However, *yi* + classifier is always stressed and means ‘one’ when it occurs in contrast to some other numeral classifier sequence. In this case, the numeral *yi* ‘one’ cannot be omitted. Thus there is the following correspondence between singular indefinites in Mandarin and English:

- (4) stressed *yi* + classifier + N       $\approx$     *one* N
- $\left\{ \begin{array}{l} \text{unstressed } yi + \text{classifier} + N \\ \emptyset + \text{classifier} + N \end{array} \right\} \approx a(n) N$

*Yixie shu* ‘some books’ in (3) on the other hand is a semantically plural indefinite full DP.<sup>3</sup>

The structure of this paper is as follows. First, in section 2, we further explore the notion of general number. We then go on to observe that (1) in which the object has general number actually has the same truth conditions as (2) which has a semantically singular object (section 3). This raises

<sup>2</sup> Deletion of *yi*, as Yang (2001) argues, is restricted by the fact that in Mandarin classifiers are either suffixes or clitics, hence must be attached to a preceding host word. It then follows that *yi* can not be omitted when the containing DP occurs in a sentence-initial position, or when intervening material prevents the classifier from cliticizing onto an appropriate host word.

<sup>3</sup> It would be tempting to analyze *yixie* ‘some’ as consisting of the numeral *yi* ‘one’ plus a classifier *xie*. However, as Marie-Claude Paris has pointed out to us, this can’t be the correct analysis because *xie* can co-occur with a classifier: *zhe xie xiang pingguo* (this some CL apple) ‘these boxes of apples’.

the question exactly what the difference is between bare nouns with general number and indefinite full DPs. The second half of the paper is devoted to answering this question. One way in which indefinite bare nouns differ from indefinite full DPs is in their scope, a well-known issue since Carlson’s groundbreaking work on English bare plurals. We will review the scope facts for Mandarin Chinese in section 4. In section 5, we then turn to another difference between indefinite bare nouns and indefinite full DPs, namely the kind of discourse anaphora they allow. Finally in section 6, we discuss pragmatic differences having to do with scalar implicatures.

Before we continue, let us note that bare nouns in Mandarin (and other languages) can have other interpretations than the indefinite one illustrated in (1). As is well known, they can also be generic or definite (Cheng and Sybesma 1999, Yang 2001, among many others), depending on a number of factors including the position of the noun phrase (preverbal or postverbal). The examples in (5)-(8) from Yang (2001) illustrate this. However, in this paper, we will only be concerned with the indefinite interpretation of bare nouns.

- (5)    Gou juezhong le  
          dog extinct    ASP  
          ‘Dogs are extinct.’
- (6)    Gou shi burudongwu.  
          dog be mammal  
          ‘Dogs are mammals.’
- (7)    Gou hen jiling.  
          dog very smart  
          i. ‘Dogs are intelligent.’  
          ii. ‘The dog(s) is/are intelligent.’
- (8)    Wo kanjian gou le.  
          I    see        dog ASP  
          i. ‘I saw some dog(s).’  
          ii. ‘I saw the dog(s).’

## 2. GENERAL NUMBER IN MANDARIN CHINESE AND OTHER LANGUAGES

### 2.1 *Number Neutral Nouns*

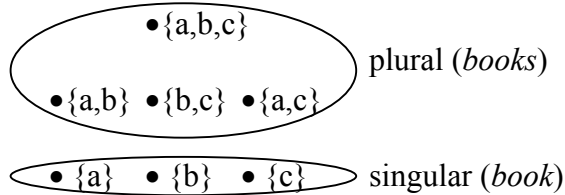
In English, nouns are obligatorily specified for number; that is, every occurrence of a noun is either singular or plural.<sup>4</sup> In many of the world's languages, however, a noun can be unspecified for number, i.e. have general number (cf. Gill 1996, Chierchia 1998a,b, Carson 2000, Corbett 2000, Dayal 2002, Farkas and de Swart 2003, among others). In (9)-(12), examples are given from languages as diverse as Mandarin Chinese, Korean, Hungarian, and Turkish:

- (9) Zuotian wo mai le shu. (Mandarin Chinese)  
yesterday I buy ASP book  
'Yesterday, I bought one or more books.'
- (10) sakwa-ka chayksang wui-ey issta (Korean; Kang 1994: 6)  
apple-NOM desk top-at exist  
'There is/are apple(s) on the desk.'
- (11) Mari verset olvas. (Hungarian; Farkas and de Swart 2003: 12)  
Mari poem.ACC read  
'Mari is reading a poem/poems.'
- (12) Kitap al-di-m (Turkish; Bliss 2003)  
book buy-PAST-1S  
'I bought a book/books.'

The difference between languages like English in which nouns are always specified for number and languages in which nouns may have general number can be captured quite straightforwardly in formal semantic terms. We assume a model in which the domain of entities of type  $e$  constitutes a complete free atomic join semi-lattice containing both singular entities (atoms) and their sums (pluralities) (Link 1983). For convenience, we will model atoms as singleton sets and pluralities as non-singleton sets, as in Landman (1989). The part-of relation of the semi-lattice is then the subset relation  $\subseteq$ , and the join operation is set-theoretic union  $\cup$ .

In English-type languages, a singular count noun (which typically is morphologically unmarked) denotes a set of atoms, whereas the corresponding plural noun (usually formed by the addition of a plural affix) denotes the set of all pluralities that can be built out of the atoms:

(13) **Denotation of a singular and plural nouns in English**



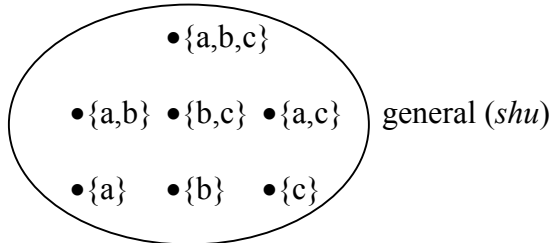
We will assume the following semantics for the plural morpheme:<sup>5</sup>

(14)  $PL(N) = *N - At$

where  $*N$  is the closure under union of  $N$  and  $At$  is the set of atoms.

In languages with general number, on the other hand, the base form of a count noun denotes a set containing both atomic entities and pluralities. In other words, the denotation of the base form of the noun is a complete semi-lattice generated by a set of atoms:

(15) **Denotation of a noun with general number (e.g. Mandarin Chinese)**



Note that the denotation of a noun with general number is closed under union (or “cumulative”), just like the denotation of a plural noun in English. As Chierchia (1998a,b) puts it, nouns in Chinese have their “plurality built in”. According to Chierchia, this is a property they share with mass nouns

<sup>4</sup> A possible exception to this are nouns that are the non-head member of a compound such as *stamp collection*.

<sup>5</sup> Here we depart from Chierchia (1998a) who defines  $PL(N)$  as  $*N - N$ . As will become clear below, Chierchia’s definition gives the wrong result for languages in which nouns have general number, but which do have a plural marker. Although Chierchia conjectures that such languages do not exist, they in fact do.

in English, such as *water* and *furniture*. In Chinese then, all nouns are mass nouns. In this paper, we will ignore the contentious issue of what the exact nature of the mass/kind distinction is, which raises many difficult problems of a metaphysical nature that we are not prepared to answer. For this reason, instead of saying that the bare nouns in sentences like (9)-(12) mass nouns, we will say that they have general number.<sup>6</sup>

## 2.2 Bare Nouns Are Not Ambiguous

It is important to emphasize that a noun with general number is not ambiguous between a singular and a plural reading. (9) for instance is not ambiguous between one reading on which it means ‘Yesterday I bought a book’ and another reading which means ‘Yesterday I bought books.’ Rather, the sentence is unambiguous and has a single meaning which in English can only be paraphrased by means of a circumlocution such as ‘Yesterday I bought one or more books.’ In the case of Mandarin, evidence for this claim comes from traditional ambiguity tests (Zwicky and Sadock 1975, Cruse 1986). To see how such tests work, consider the English word *pen* which is ambiguous between the senses ‘writing implement’ and ‘enclosure’ (as in *pig pen*). In a conjoined sentence with VP deletion in the second conjunct, such as (16a), the deleted occurrence of the noun in the second conjunct must always be interpreted with the same sense as its antecedent:

- (16) a. John saw a pen and Mary did too.  
b. John saw a pen and Mary saw one too.

Therefore (16a) can mean either ‘John saw a writing implement and Mary also saw a writing implement’ or ‘John saw an enclosure and Mary saw an enclosure’. Crucially, the sentence cannot mean ‘John saw a writing implement and Mary also saw an enclosure’, or ‘John saw an enclosure

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<sup>6</sup> It should be noted that according to Chierchia (199a,b) – following Krifka (1995) – nouns in Mandarin and other classifier languages denote kinds. However, this is not such a big difference as it might appear, given the availability of the type shifter  $\cup$  which maps a kind onto the set of the (atomic and non-atomic) entities that realize it.  $\cup$  is defined in such a way that it always yields a set that is closed under union, i.e. after application of  $\cup$  the noun has general number (or is “mass” in Chierchia’s terms). Conversely, the denotation of Mandarin nouns depicted in (15) can be mapped onto the corresponding kind by Chierchia’s other type shift  $\cap$ . So our analysis differs from Chierchia’s at most in which of the two possible denotations of bare nouns is taken to be basic and which derived.

and Mary saw a writing implement.’ That is, the sentence has only two of the four logically possible readings. The same is true for examples with *one*-pronominalization such as (16b). Contrast this with a word like *child* which is truly unspecified as to the sex of its referent. The noun *child* is obviously not ambiguous between a reading on which it means ‘girl’ and another reading on which it means ‘boy’; it simply can apply to underaged persons of either sex. (Of course the word *child* can be ambiguous in other ways, but the point is that it is not ambiguous with respect to the boy/girl distinction.) Now take (17a) and (b):

- (17) a. John saw a child and Mary did too.  
b. John saw a child and Mary saw one too.

These sentences can be true in situations of four different types: in situations in which John and Mary both saw a girl or John and Mary both saw a boy, but also in situations in which John saw a boy and Mary a girl, or vice versa. The children that John and Mary saw do not have to be of the same sex. Note by the way that crucially we do not claim that (17a) and (b) are four-ways ambiguous—both sentences have only one reading which is completely neutral as to the sex of the children involved.

Mandarin does not have VP deletion in this type of sentence, but it does have a functionally equivalent construction in which the object is deleted while the verb is retained, as in (18a,b):

- (18) a. Wo you tie fanwan. Yuehan ye you.  
I have iron bowl. John also have  
‘I have one or more iron bowls. So does John.’ or  
‘I have one or more steady jobs. So does John.’  
(Cannot mean ‘I have one or more steady jobs. John has one or more iron bowls’ or  
‘I have one or more iron bowls. John has one or more steady jobs.’)  
b. Wo kanjian le xiuhua zhentou. Yuehan ye kanjian le.  
I see ASP embroider pillow. John also see ASP  
‘I saw one or more pillows with an embroidered case. So did John.’ or  
‘I saw one or more outwardly attractive but worthless guys. So did John.’

(Cannot mean ‘I saw one or more embroidered pillows. John saw one or more outwardly attractive but worthless persons.’ or ‘I saw one or more outwardly attractive but worthless persons. John saw one or more embroidered pillows.’)

This construction can be used as a test for ambiguity in the same way as VP deletion in English. The nouns *tie fanwan* in (18a) and *xiuhua zhentou* in (18b) are each ambiguous. *Tie fanwan* can mean either ‘iron bowl’ or ‘steady job’, and *xiuhua zhentou* is ambiguous between the senses ‘embroidered pillow’ and ‘attractive but worthless person.’ When the object is deleted under identity in the second conjunct, the deleted phrase needs to have the same sense as its antecedent. As a result, the two-sentence discourse as a whole is only two-ways ambiguous, not four-ways. When we apply this test for ambiguity to bare nouns in Mandarin we find that it confirms the claim that they are unspecified for number, rather than ambiguous. (19) can be used in a situation in which the speaker and John each bought one book, or in which they each bought more than one book, but also in situations in which the speaker bought one book and John bought more than one, or vice versa:

- (19) Zuotian      wo mai le shu. Yuehan ye mai le.  
Yesterday I buy ASP book. John also buy ASP.  
‘Yesterday I bought one or more books. So did John.’

### 2.3 General vs. Plural

The phenomenon of general number cannot simply be equated with total absence of number or number marking from a language. Several of the languages mentioned above actually do have plural morphemes (Kang 1994, Carson 2000, Corbett 2000, Farkas and de Swart 2003; *pace* Chierchia 1998a,b):

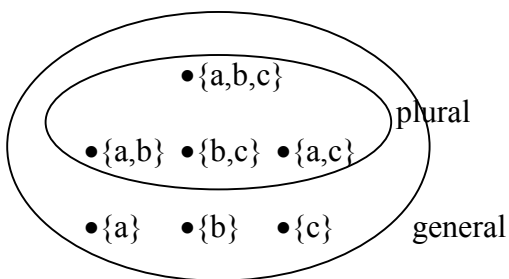
- (20) sakwa-tul-i      chayksang wui-ey issta (Korean: Kang 1994: 6)  
apple-PL-NOM desk top-at exist  
‘There are apples on the desk.’



- (21) Mari verseket olvas. (Hungarian; Farkas and de Swart 2003: 12)  
 Mari poem.PL.ACC read  
 ‘Mari is reading a poem/poems.’
- (22) Kitap-lar al-dı-m (Turkish; Bliss 2003)  
 book-PL buy-PAST-1SG  
 ‘I bought books.’

Here the plural form of the noun will have a denotation that is a subset of the denotation of the noun itself, namely the subset containing all non-atomic members of the denotation of the noun (cf. Kang 1994, Carson 2000).

- (23) **Denotation of unmarked and plural noun in language with general number (e.g. Korean, Hungarian, Turkish)**



Note that the semantics of the plural as defined in (14) above will work for languages in which the noun has general number as well. Since for any noun denotation  $N$  in these languages,  $*N = N$  (i.e., the noun denotation is closed under union),  $PL(N) = *N - At = N - At$ .<sup>7</sup>

In a language which has general number as well as a plural marker, a situation involving more than one entity may in principle be described using either a plural noun or a noun with general number. For instance, the English sentence *There are apples on the desk* can be translated into Korean as either (10) or (20). This means that plural marking is in effect optional or “facultative” (Corbett 2000).

<sup>7</sup> Chierchia’s definition of  $PL(N)$  as  $*N - N$  would result in the denotation of the plural noun being empty. On the basis of this he predicts that languages in which all nouns have general number (or are mass nouns, in his terminology) cannot have a plural marker, but as the examples of Turkish, Korean and Malay show, this prediction is incorrect.



semantically plural, in particular numerals greater than ‘one’ (cf. Ortman 2000):

- (26) sakwa twu kay (Korean; Kang 1994: 2)  
apple two CL  
‘two apples’
- (27) öt hajó (Hungarian; Ortman 2000: 252)  
five ship  
‘five ships’
- (28) kırk harami (Turkish; Underhill 1979: 125)  
forty thief  
‘forty thieves’

We take this as additional evidence that in these languages the noun is number neutral, and hence compatible with determiners that are inherently plural. Note that some of the languages with general number require (or at least allow) the use of numeral classifiers when the noun is modified by a numeral. However, this is not the case for all languages with general number. Mandarin and Korean require numeral classifiers, but Turkish and Hungarian do not. It is likely that there is a close connection between general number and the use of numeral classifiers. We hypothesize that having general number is a necessary but not a sufficient condition for having numeral classifiers; that is, all languages in which classifiers are required with numerals also have general number, but not all languages that have general number obligatorily have numeral classifiers.

The idea that in languages with numeral classifiers the (unmarked) noun has general number is supported by Sanches (1973) who suggests the following implicational universal:

- (29) If a language includes numeral classifiers as its dominant mode of forming quantification expressions, then it will also have facultative expression of plural. In other words, it will not have obligatory marking of the plural on nouns. (Sanches 1973: 4)

Recall from what we said above that “facultative” number marking simply means that the denotation of a noun without a plural marker denotes not just a set of atoms but the whole semi-lattice generated by the atoms, including the pluralities (see the picture in (23)); in other words, the

unmarked noun has general number. Sanches's universal directly contradicts Chierchia's (1998a,b) prediction that in classifier languages nouns can never be pluralized. Counterexamples to Chierchia's generalization are classifier languages which do have a plural marker, such as Korean and Malay/Indonesian (Kang 1994, Chung 2000, Carson 2000).

### 3. TRUTH CONDITIONS

Given that bare nouns in Mandarin have general number, an important question arises. Consider again (1), repeated here as (30), which contains a bare noun with an indefinite interpretation, and compare it to the corresponding sentence with a singular indefinite full DP or its English counterpart with the determiner  $a(n)$ :

- (30) Zuotian wo mai le shu.  
 yesterday I buy ASP book  
 'Yesterday, I bought one or more books.'
- (31) Zuotian wo mai le (yi) ben shu.  
 yesterday I buy ASP one CL book.  
 'Yesterday, I bought a book.'
- (32) Yesterday I bought a book.

In the Gricean tradition it is generally assumed that (31) and (32) are actually true if the speaker bought more than one book. The fact that, without further information, the hearer is entitled to conclude from (31)/(32) that the speaker did not buy more than one book is regarded as a conversational implicature rather than a logical entailment of the sentence. But if (31)/(32) is true iff the speaker bought one or more books, then what exactly is the difference between (31)/(32) in which the noun is singular and (30) in which the noun has general number? We will adopt the position that (30) and (31)/(32) indeed do have the same truth conditions. Of course, this does not mean that bare nouns and indefinite full DPs have the same meaning. There are important semantic and pragmatic differences between the two. The remainder of this paper discusses three such

differences, namely scope (section 4), discourse anaphora (section 5), and scalar implicatures (section 6).

## 4. SCOPE

### 4.1 *Bare Nouns (Appear to) Take Narrow Scope*

Chinese bare nouns behave in essentially the same way as English bare plurals with respect to scope. Carlson (1977) has demonstrated with an extensive battery of tests that English bare plurals always seem to take the narrowest possible scope, unlike singular or plural indefinites with a determiner (e.g., *a book* and *some books*) which may take either wide or narrow scope. (See also Chierchia 1998b for a recent summary and update of Carlson's analysis of bare plurals.) As Yang (2001) has shown, Carlson's observations carry over to Mandarin Chinese. We will just discuss a small but representative subset of the relevant data.

The scopal contrast between bare nouns and indefinite DPs is manifested in opaque contexts:

- (33) a. Minnie wishes to talk with a young psychiatrist. (wide or narrow scope)  
 b. Minnie wishes to talk with young psychiatrists. (only narrow scope)
- (34) a. Mini xiang gen yige nianqing de xinlixuejia tantan. (wide or narrow)  
 Minnie wish with one-CL young MOD psychiatrist talk  
 'Minnie wishes to talk with a young psychiatrist'
- b. Mini xiang gen nianqing de xinlixuejia tantan.  
 Minnie wish with young MOD psychiatrist talk
- i. 'Minnie wishes to talk with young psychiatrists' (narrow scope)  
 ii. 'Minnie wishes to talk with the young psychiatrist(s)' (definite reading)

In (33a), the singular indefinite *a young psychiatrist* can take either wide or narrow scope with respect to the opacity-inducing verb *wishes*, whereas in (33b) the bare plural *young psychiatrists* can only take narrow scope. This is also true for their Mandarin Chinese equivalents in (34a,b).

Note however that the Chinese bare noun also has the option of taking a definite reading which should not be confused with a wide-scope indefinite interpretation.

That bare plurals do not take wide scope is also true in the presence of a universal quantifier:

- (35) a. Everyone read a book on caterpillars. (wide or narrow)  
 b. Everyone read books on caterpillars. (only narrow scope)
- (36) a. Meige ren dou du guo yiben guanyu youchong de shu.  
 every-CL person all read ASP one-CL on caterpillar MOD book  
 ‘Everyone read a book on caterpillars’ (wide or narrow)  
 b. Meige ren dou du guo guanyu youchong de shu.  
 every-CL person all read ASP on caterpillar MOD book  
 ‘Everyone read books on caterpillars’ (narrow scope)

In (35a), the indefinite singular *a book on caterpillars* can take either wide or narrow scope with respect to the universal quantifier *everyone*. In contrast, the bare plural *books on caterpillars* in (35b) can only take narrow scope. This observation also carries over to Mandarin Chinese.

Indefinite singulars and bare plurals also exhibit what Carlson (1997) calls “differentiated scope”: the fact that a bare plural can sometimes even have narrower scope than an indefinite singular possibly could:

- (37) a. # A dog was everywhere.  
 b. Dogs were everywhere.
- (38) a. # Yizhi gou dao chu dou shi.  
 one-CL dog everywhere all be  
 ‘A dog was everywhere.’  
 b. Gou dao chu dou shi.  
 dog everywhere all be  
 ‘Dogs were everywhere.’

In (37a), the indefinite singular *a dog* can only have a wide scope reading, in which the same dog pops up everywhere. In (37b), however, the bare plural *dogs* can only take narrow scope, with the

universal *everywhere* having wide scope. As (38) shows, this differentiated scope phenomenon can also be observed in the scope behaviour of Mandarin indefinite singulars and bare nouns.

#### 4.2 Two Approaches to Obligatory Narrow Scope of Bare Nouns

In the literature there are two approaches for explaining the obligatory narrowest scope behavior of bare nouns. On the one hand there is the Carlsonian analysis according to which bare nouns refer to kinds (Carlson 1977, Krifka 1995, Chierchia 1998a,b, Dayal 1999, 2002, among others). In this approach bare nouns are names for kinds, and therefore they are scopeless just like proper names for concrete individuals. The existential force of sentences like (1), repeated here as (39), is due not to the bare noun itself but to the environment in which it appears. In Carlson's own analysis, the existential quantification is built into the lexical meaning of the verb. Chierchia (1998b) has proposed an alternative version of the same general approach, in which the kind-denoting term combines with a verb through a special semantic rule, which he dubs Derived Kind Predication (DKP), given in (40). (41) illustrates the application of this rule in a case like (39). Here  $\cap$  is an operator mapping a noun denotation onto the corresponding kind, whereas  $\cup$  conversely maps a kind onto the set of its realizations (for details see Chierchia 1998b). Note that DKP will have to be suitably restricted to apply only "locally" in order to account for the obligatory narrowest scope for bare nouns (Krifka 2003):

(39) Zuotian wo mai le shu.

yesterday I buy ASP book.

'Yesterday, I bought one or more books.'

(40) **Derived Kind Predication (DKP)** (Chierchia 1998b)

If P applies to objects and k denotes a kind, then  $P(k) = \exists x[\cup k(x) \wedge P(x)]$

(41) buy(I,  $\cap$ book)

$\Leftrightarrow \exists x[\cup \cap \text{book}(x) \wedge \text{buy}(I, x)]$  (by DKP)

$\Leftrightarrow \exists x[\text{book}(x) \wedge \text{buy}(I, x)]$

The alternative approach is to treat bare nouns as properties (see, among many others, Dobrovie-Sorin 1997, van Geenhoven 1998, 1999, van Geenhoven and McNally 2002, Chung and Ladusaw 2003, and Farkas and de Swart 2003). There are different versions of this approach as well. We will here briefly sketch Chung and Ladusaw’s recent account (Chung and Ladusaw 2003). According to them there are two “modes of composition” for a predicate and its syntactic argument: saturation and restriction. An argument which saturates the predicate reduces its arity by one, in the familiar way. For a syntactic argument to restrict the predicate, on the other hand, means that the argument slot of the predicate is not filled, but that a restriction is added to it. Using this framework, we may hypothesize that bare nouns in Mandarin combine with the verb through restriction rather than saturation. That is, in (39) *shu* ‘book’ functions as a property which restricts the object argument variable of the verb to books, as in (42). Subsequently, the operation of Existential Closure (EC) applies at the VP level binding the object variable, as in (43).

$$(42) \text{ Restrict}((\lambda y \lambda x [\text{buy}(y)(x)]), \text{book})$$

$$\Leftrightarrow \lambda y \lambda x [\text{buy}(y)(x) \wedge \text{book}(y)]$$

$$(43) \text{ EC}(\lambda y \lambda x [\text{buy}(y)(x) \wedge \text{book}(y)])$$

$$\Leftrightarrow \lambda x \exists y [\text{buy}(y)(x) \wedge \text{book}(y)]$$

Alternatively, we could achieve the existential reading of the bare noun by means of a type-shift that applies to the verb (van Geenhoven’s semantic incorporation).

In either approach, bare nouns are not quantifiers, and the existential interpretation is due to something else external to bare noun. Because bare nouns are not quantifiers they cannot take wide scope. Indefinite full DPs, on the other hand, are existential quantifiers and as such can take wide scope through Quantifier Raising (or any other device responsible for wide scope of quantifiers).<sup>8</sup>

Since both the (neo-)Carlsonian kind-based and the property-based approach are compatible with what we have to say in this paper, we will not try to decide between them here. One apparent advantage of the kind-based approach is that it allows for a unified treatment of existential and generic interpretations of bare nouns. However, once we allow type-shifting between kinds and

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<sup>8</sup> In recent years, many researchers have argued that indefinite DPs are not quantifiers and that their apparent “wide scope” readings are not due to a mechanism like QR which applies only to quantifiers, but to some other semantic device such as choice functions. These approaches are equally compatible with what we say in this paper, as long as whatever it is that gives indefinite full DPs “wide scope” cannot apply to bare nouns.



properties with operators such as  $\cup$  and  $\cap$  the way Chierchia does, the difference between the two approaches becomes much less pronounced. For instance, a hybrid account is possible in which the basic denotation of a bare noun is a property which can combine with the verb through something like van Geenhoven's semantic incorporation or Chung and Ladusaw's Restrict operation, but can shift to kind with  $\cap$  to derive generic readings (see Krifka 2003 for a particular proposal).

In the context of the present paper, the question naturally arises what either approach has to say about the issue of general number. Chierchia's neo-Carlsonian analysis seems to have an explanation for why it appears to be the case that across languages indefinite bare nouns usually either have general number (as in Mandarin) or are plural (as in English). The type shift  $\cap$  mapping a noun denotation to the corresponding kind is only defined if the noun denotation is closed under union, which is the case if the noun has general number or is plural, but not if it is singular. Since in Chierchia's analysis the indefinite interpretation is derivative of the kind interpretation, it seems to make the right prediction in this respect. However, as Dayal (2002) points out, some languages (Hindi, Russian) do appear to have true bare singulars.<sup>9</sup> We can't do justice here to Dayal's very interesting paper which explores the connections between number marking and kind reference, and leave this as an issue for further research.

## 5. DISCOURSE ANAPHORA

In English, a singular indefinite can only be referred back to by a singular pronoun, whereas a plural indefinite requires a plural pronoun:

- (44) a. Yesterday I bought a book. I brought it/\*them home with me.  
 b. Yesterday I bought (some) books. I brought them/\*it home with me.

We can use the potential for allowing singular or plural discourse anaphora as a probe for the semantic number of bare nouns and indefinite full DPs.

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<sup>9</sup> It is interesting to note that so-called bare singulars in Brazilian Portuguese really appear not to be singular but have general number (Schmitt and Munn 1999).

In Mandarin, bare nouns can be the antecedent for either a singular or a plural overt pronoun as in (45a,b), or for a null pronoun which itself is unspecified for number, as in (45c). (The overt pronoun in (45b) is a bit less natural than the null pronoun in (45c); the choice between an overt or null pronoun is governed by factors such as animacy which need not concern us here.)

- (45) a. Zuotian wo yudao le tongshi. Wo quing ta/tamen chifan le.  
 Yesterday I meet ASP colleague. I invite {him,her}/them eat ASP  
 ‘Yesterday, I met one or more colleagues. I invited him/her/them to dinner.’
- b. Zuotian wo mai le shu. Wo ba ta/tamen dai hui jia le.  
 yesterday I buy ASP book. I BA it/them bring back home ASP  
 ‘Yesterday, I bought one or more books. I brought it/them home.’
- c. Zuotian wo mai le shu. Wo dai Ø hui jia le.  
 yesterday I buy ASP book. I bring back home ASP  
 ‘Yesterday, I bought one or more books. I brought it/them home.’

This contrasts with indefinite full DPs which are either singular or plural. In Mandarin, singular indefinite DPs of the form ‘(yi) CL N’ can only antecede the singular pronoun *ta* ‘him/her’ or a null pronoun. DPs of the form ‘yixie N’ are semantically plural and require a plural or a zero pronoun:

- (46) a. Zuotian wo yudao le (yi) ge tongshi. Wo quing ta/\*tamen chifan le.  
 Yesterday I meet ASP one CL colleague. I invite {him,her}/\*them eat ASP  
 ‘Yesterday, I met one colleague. I invited him/her to dinner.’
- b. Zuotian wo mai le (yi) ben shu. Wo ba ta/\*tamen dai hui jia le.  
 yesterday I buy ASP one CL book. I BA it/\*them bring back home ASP  
 ‘Yesterday, I bought one book. I brought it home.’
- c. Zuotian wo mai le (yi) ben shu. Wo dai Ø hui jia le.  
 yesterday I buy ASP one CL book. I bring back home ASP  
 ‘Yesterday, I bought one book. I brought it home.’
- (47) a. Zuotian, wo yudao le yixie tongshi. Wo qing \*ta/tamen chifan le.  
 yesterday, I meet ASP some colleague. I invite {\*him,\*her}/them eat ASP  
 ‘Yesterday, I met some colleagues. I invited them to dinner.’

- b. Zuotian, wo mai le yixie shu. Wo ba \*ta/tamen dai hui jia le  
yesterday, I buy ASP some book. I BA \*it/them bring back home ASP.  
'Yesterday, I bought some books. I brought them home.'
- c. Zuotian, wo mai le yixie shu. Wo dai Ø hui jia le  
yesterday, I buy ASP some book. I bring back home ASP.  
'Yesterday, I bought some books. I brought them home.'

We see that although sentences containing an indefinite with general number may have the same truth conditions (or “static” semantics in the terminology of Groenendijk and Stokhof 1990) as their counterparts with a singular indefinite, they differ in the effect they have on the discourse context (i.e., their “dynamic” semantics). This effect can be described in terms of the kind of discourse referent that is introduced by the indefinite. Whereas singular indefinites introduce a singular discourse referent and plural indefinites introduce a plural discourse referent, indefinites that have general number introduce a discourse referent that is itself unspecified for number, and which therefore can be “picked up” by a singular pronoun, a plural pronoun, or by a pronoun with general number.

Finally, it is interesting to note that there is significant crosslinguistic variation with respect to “discourse transparency” of bare nouns (see van Geenhoven 1998, Dayal 1999, Farkas and de Swart 2003), another issue which deserves further exploration.

## 6. SCALAR IMPLICATURES

### 6.1 Horn's Scales and Diagnostics

A third non-truth-conditional difference between indefinite bare nouns and singular indefinites is in the kinds of conversational implicature they can give rise to. As noted above, singular indefinites such as *a book* are truth-conditionally equivalent to *at least one book*; the upper-bounding inference *not more than one book* that can (normally) be made when the sentence is uttered is a conversational implicature which arguably follows from Grice's Maxim of Quantity (Grice 1967). This upper-bounding implicature can be cancelled, unlike entailments:

- (48) a. John bought a book. In fact, he bought five books.  
 b. # John bought five books. In fact, he didn't buy a book. (contradiction)

Grice's seminal insights about quantity-based implicatures were worked out in more detail by Horn (1972, 1989, 1992). Scalar expressions can be arranged from left to right on a Horn scale in order of decreasing informativeness or semantic strength:

- (49) <all, some>  
 <and, or>  
 <sweltering, hot, warm>  
 <love, like>  
 <n, ...5, 4, 3, 2, 1>

On a Horn scale, an item on the left (i.e. a stronger expression) entails any item(s) to its right (i.e. weaker expressions), but not vice versa. Therefore, the (a) sentences in (50)-(51) entail the (b) sentences.

- (50) a. The room is sweltering.  
 b. The room is hot  
 (51) a. All the boys went to the party.  
 b. Some of the boys went to the party.

On the other hand, assertion that a weaker expression on a Horn scale obtains implicates that stronger ones do not. Therefore, the (a) sentences in (52)-(53) implicate the (b) sentences.

- (52) a. The room is hot.  
 b. The room is not sweltering.  
 (53) a. Some of the boys went to the party.  
 b. Not all of the boys went to the party.

One of Horn's main diagnostics for the presence of scalar implicatures involves the English expression *in fact*, which can be used to signal implicature cancellation:

- (54) a. She is pretty. In fact she is beautiful.  
 b. # She is beautiful. In fact she is pretty  
 c. # She is pretty. In fact she is ugly

In (54a), the second clause is a denial of the scalar implicature generated by the first clause, as signalled by the presence of *in fact*. In (54b), the second clause is an entailment of the first clause, and therefore *in fact* is out of place. In (54c), the second clause is a contradiction of the first clause, which cannot be cancelled. Mandarin Chinese has an expression *shishishang* which behaves just like *in fact*, and which therefore can similarly be used as a diagnostic:

- (55) a. Ta hen haokan. Shishishang ta hen piaoliang.  
 she very pretty. in fact she very beautiful  
 'She is very pretty. In fact she is very beautiful'  
 b. # Ta hen piaoliang. Shishishang ta hen haokan.  
 she very beautiful. In fact she very pretty  
 'She is beautiful. In fact she is pretty'  
 c. # Ta hen haokan. Shishishang ta hen chou.  
 she very pretty. in fact she very ugly  
 'She is very pretty. In fact she is very ugly'

Another well-known diagnostic for scalar implicatures due to Horn is the use *if not*. A construction of the form *X if not Y* (where *X* and *Y* are part of a Horn scale, and *Y* is stronger than *X*) serves to assert *X* while suspending the scalar implicature that *Y* does not obtain. As the following examples show, *X if not Y* is indeed only well formed if *Y* is a stronger expression than *X* on a Horn scale.

- (56) a. He is a millionaire if not a billionaire.  
 b. # He is a billionaire if not a millionaire.  
 c. # He is a millionaire if not a pauper.

Mandarin has a construction similar to English *if not*, which functions just like its English counterpart:

- (57) a. Ta bu shi yiwanfuweng ye shi baiwanfuweng.  
he not be billionaire at least be millionaire  
'He is a millionaire if not a billionaire'
- b. # Ta bu shi baiwanfuweng ye shi yiwanfuwen.  
he not be millionaire at least be billionaire  
'He is a billionaire if not a millionaire'
- c. # Ta bu shi yiwanfuweng ye shi qigai.  
he not be billionaire at least be pauper  
'He is a pauper if not a billionaire'

## 6.2 Applying the Diagnostics to Mandarin Bare Nouns and Full DPs

Just as in English, singular indefinites in Mandarin trigger the scalar implicature that not more than one entity is involved. However, this scalar implicature is absent with bare nouns. This is shown by the fact that while singular indefinites are compatible with an expression marking the cancellation of a scalar implicature such as *shishishang* 'in fact', bare nouns are not:

- (58) a. Zuotian wo mai le yi ben shu. Shishishang, wo mai le wu ben.  
yesterday I buy ASP one CL book. In fact, I buy ASP five CL  
'Yesterday I bought a book. In fact, I bought five'
- b. # Zuotian wo mai le shu. Shishishang, wo mai le wu ben.  
yesterday I buy ASP book. In fact, I buy ASP five CL  
'Yesterday I bought one or more books. In fact, I bought five'

Note in passing that the version of (58a) without *yi* is somewhat less good than that the one with *yi*. We attribute this difference to a need to signal the contrast between ‘one’ in the first clause and ‘five’ in the second.

It is interesting to observe that Mandarin has another expression *zhunque de shuo* ‘to be exact’, which can be used to further specify the number of entities involved, but does not cancel the scalar implicature. This expression shows the opposite pattern from *shishishang* ‘in fact’: it is fine with bare nouns but is much less felicitous with singular or plural indefinites:

- (59) a. # Zuotian wo mai le yi ben shu. Zhunque de shuo, wo mai le wu ben  
yesterday I buy ASP one CL book. exactly MOD say I buy ASP five CL  
‘Yesterday, I bought bought a book. To be exact, I bought five.’
- b. Zuotian wo mai le shu. Zhunque de shuo, wo mai le wu ben  
yesterday I buy ASP book. exactly MOD say I buy ASP five CL  
‘Yesterday, I bought bought one or more books. To be exact, I bought five.’

The *if not* diagnostic similarly demonstrates that unlike singular full DPs, bare nouns in Mandarin do not trigger the upper-bounding scalar implicature ‘not more than one’:

- (60) a. Ta ruguo mei you liangge haizi ye rou yige.  
he if not have two-CL child at least have one-CL  
‘He has one child, if not two.’
- b. # Ta ruguo mei you liangge haizi ye rou haizi.  
he if not have two-CL child at least have child  
‘He has a child/children, if not two.’

Of course we are not claiming that Mandarin bare nouns lack scalar implicatures altogether. Although they do not trigger scalar implicatures related to number, they may have scalar implicatures if the noun itself can plausibly be regarded as a scalar expression:

- (61) a. Ta mai le shu. Shijishang ta mai le baikequanshu.  
 he buy ASP book. In fact he buy ASP encyclopedia  
 ‘He bought one or more books. In fact he bought one or more encyclopedias.’
- b. Ta ruguo bu shi baichi ye shi shagua.  
 he if not be idiot at least be fool  
 ‘He was a fool if not an idiot.’

### 6.3 Metalinguistic Negation

Further evidence comes from the phenomenon of metalinguistic negation (Horn 1989; see also Geurts 1998 for a somewhat different perspective). Metalinguistic negation is the use of negation to signal a rejection of the corresponding positive sentence for any reason other than its truth conditions. Possible reasons include the sentence’s pronunciation, its register, its presupposition, and — most relevant for our purposes — its conversational implicatures, as demonstrated in (62). Metalinguistic negation can also be observed in Mandarin, as shown in (63):

- (62) a. I don’t LIKE him — I LOVE him.  
 b. She is not PRETTY — She is BEAUTIFUL.
- (63) a. Wo bu zhi xihuan ta, ershi ai ta.  
 I not just like him, but love him  
 ‘I don’t just like him — I love him’
- b. Ta bu zhi haokan, ershi piaoliang.  
 she not just pretty, but beautiful  
 ‘She is not pretty — she is beautiful.’

(64) demonstrates that in Mandarin metalinguistic negation of the scalar implicature ‘not more than one’ is possible with singular indefinites but not with bare nouns.<sup>10</sup> This is additional evidence that

<sup>10</sup> Note that for reasons which we do not quite understand *zhi* ‘just’ cannot be omitted from these examples (our thanks to Marie-Claude Paris for pointing this out to us). This might mean that (64a,b) are not really cases of metalinguistic negation, but rather involve ordinary negation of ‘just’. However, because ‘just’ itself is scalar, the contrast between (64a) and (b) still support our claim that bare nouns do not evoke numerical scales in contrast to full indefinite DPs.



bare nouns do not trigger the scalar implicature ‘not more than one’. (65) shows that in this respect English bare plurals behave the same way as bare nouns in Mandarin:

- (64) a. Wo bu zhi shi mai le yi ben shu, ershi mai le wu ben.  
 I not just be buy ASP one CL book but buy ASP five CL  
 ‘I didn’t buy one book. I bought five.’  
 b. # Wo bu zhi shi mai le shu. ershi mai le wu ben.  
 I not just be buy ASP book but buy ASP five CL.  
 ‘I didn’t buy one or more books. I bought five.’
- (65) a. I didn’t buy ONE/A book – I bought FIVE.  
 b. # I didn’t buy books – I bought FIVE.

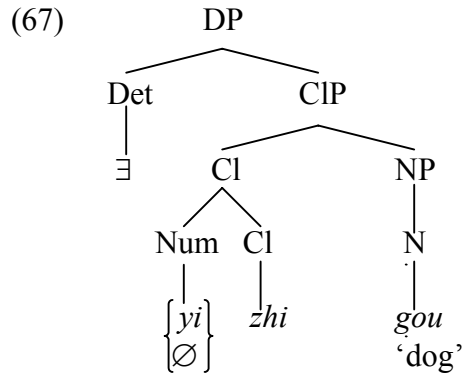
#### 6.4 Discussion

Why don’t bare nouns trigger scalar implicatures about number, as opposed to indefinite full DPs? The reason is that for a scalar implicature to arise the utterance must contain a lexical item that is a member of a Horn scale which also contains stronger alternative expressions that the speaker could have used instead but didn’t. But bare nouns are quite literally bare: they consist of just the head noun (plus possible modifiers) but do not contain any functional morphemes such as classifiers, numerals, or determiners. Bare nouns, we assume, are simply NPs, that is, phrasal projections of the head noun N, without any functional projections “on top”.<sup>11</sup>

- (66) NP  
 |  
 N  
 |  
*gou*  
 ‘dog’

<sup>11</sup> Here we adopt the DP hypothesis of Abney (1987) and much subsequent work, according to which what is traditionally called a noun phrase is really the maximal projection DP of the determiner D, whereas NP is the maximal projection of N without any functional items (corresponding to N' in earlier generative theorizing).

Indefinite full DPs, however, do have functional structure above NP. In the syntactic literature there is considerable disagreement about the internal syntactic structure of Chinese DPs, with almost every author proposing a different structure (Tang 1990, Krifka 1995, Yang 2001, Li 1999, Cheng and Sybesma 1999, among others). Fortunately, for our purposes these details are not very important, as long as full DPs have functional projections whereas bare nouns don't. For the sake of concreteness let's assume that indefinite full DPs contain at least two layers on top of NP: CIP, headed by the classifier Cl, and DP (Tang 1990):<sup>12</sup>



As far as the semantics is concerned, we will follow Krifka (1995) in assuming that the classifier “measures” the number of atoms in a plurality (and adds sortal restriction, which we will ignore here) (Krifka 1995). The existential quantification we assume – again somewhat arbitrarily – is performed by the (empty) indefinite determiner. Keeping things simple, and not worrying about questions of compositionality, the meaning of the DP *(yi) zhi gou* ‘one/a dog’ is as represented in (68):

$$(68) \quad \lambda P \exists x [\text{dog}(x) \wedge \text{card}(x) = 1 \wedge P(x)]$$

The scalar implicature triggered by indefinite full DPs crucially depends on the presence of a numeral. Numerals form a Horn scale  $\langle n, \dots, \text{five}, \text{four}, \text{three}, \text{two}, \text{one} \rangle$ , or in Mandarin  $\langle n, \dots, \text{wu}, \text{si}, \text{san}, \text{er/liang}, \text{yi} \rangle$ . The scalar implicature arises because the speaker chooses a particular item on

<sup>12</sup> In this structure the classifier is assumed to form a constituent with the numeral, reflecting the considerable evidence that in Mandarin and crosslinguistically numeral-classifier are closely associated with each other and form a syntactic unit. An alternative would be to treat the numeral as a head which projects its own functional projection (cf. Cheng and Sybesma 1999).

this scale, say *yi* ‘one’, as opposed to any of the stronger lexical items (i.e., higher numerals) that she could have chosen (see Horn 1992 for a defense of the neo-Gricean approach to scalar implicatures involving numerals). With bare nouns, by contrast, there is no numeral, and hence no Horn scale or scalar implicature either. Note that in this explanation it is crucial that in Horn’s version of the Gricean framework scalar implicatures are triggered by specific lexical items in the sentence, rather than more indirectly by the sentence’s truth conditions.

This account of the absence of numerical scalar implicatures with bare nouns has an interesting theoretical consequence regarding the status of null elements. Recall that in Mandarin the numeral *yi* ‘one’ can sometimes be omitted, resulting in noun phrases such as *zhi gou* ‘CL dog’. Yang (2001) argues that this is due to a rather superficial deletion of the numeral under certain circumstances. Alternatively, one could assume that there is a phonologically empty numeral with the same meaning as *yi* ‘one’. But as we saw above such singular indefinites without a numeral behave like indefinite full DPs with the numeral ‘one’ (e.g. *yi zhi gou*) and more specifically they trigger scalar implicatures, unlike bare nouns like *gou* ‘dog’. We must therefore assume that even a “deleted” or “empty” numeral counts as a lexical item that is a member of a Horn scale and can therefore trigger a scalar implicature. Thus, there is a crucial difference between the complete absence of a numeral in bare nouns, and the presence of an empty numeral in full DPs such as *zhi gou*.

## 7. SUMMARY AND CONCLUSION

In this paper we have contrasted bare nouns in Mandarin Chinese with indefinite full DPs. Bare nouns have general number (i.e., they are number neutral), whereas indefinite full DPs are either singular or plural. Nevertheless, simple sentence pairs such as *Zuotian wo mai le shu* (lit. ‘Yesterday, I bought book’) and *Zuotian wo mai le (yi) ben shu* (‘Yesterday, I bought a book’) are truth-conditionally equivalent. However, we have identified three important pragmatic and semantic differences between the two types of noun phrases, at least two of which are directly tied to the difference in number. One such difference is in the effect on discourse: Indefinite full DPs introduce singular or plural discourse referents, whereas bare nouns introduce discourse referents that are number neutral. A second difference has to do with implicatures: indefinite full DPs trigger

scalar implicatures about number, but bare nouns don't. The third difference is in scope: whereas indefinite full DPs are existential quantifiers that can take wide or narrow scope, bare nouns do not have any quantificational force of their own, and therefore always seem to take narrowest scope (but strictly speaking they are scopeless), either because they refer to kinds or because they denote properties. To what extent – and how – this last property of bare nouns is inherently connected with the fact that they have general number is still an open question.

## ACKNOWLEDGEMENTS

This research has been supported by SSHRC, grant 410-2001-1545 (principal investigator Hotze Rullmann), which is gratefully acknowledged. Earlier versions of this paper were presented at the workshop “Where Semantics Meets Pragmatics” held at the LSA Summer Institute (Michigan State University, July 11-13, 2003), at the Fifth Syntax and Semantics Conference in Paris (Oct. 2-4, 2003), and the Alberta Conference on Linguistics (Banff, Nov. 1, 2003). We thank members of the audience on those occasions for their comments and question. We are also grateful to the members of the Number Research Group at the University of Calgary for comments, suggestions, and encouragement.

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