Bare Numeral Phrases in Mandarin and the Minimalist Mapping Hypothesis

Wei-wen Roger Liao

Academia Sinica

Abstract

We pursue an agreement-based analysis of the bare numeral phrases in Chinese. Bare numeral phrases in Chinese often occur with the you marker in the preverbal position. With the marker, a bare numeral phrase obtains an individual-denoting reading, which has an existential meaning. In contrast, several syntactic environments do not need the you marker, and the bare numeral phrase obtains the quantity-denoting reading. In addition to the existential you marker, we observe that the distributions of the two readings are correlated to the lower (root) modals (Mod) and the middle aspects (Asp). We argue that the correlation can be analyzed through syntactic feature agreement. That is, the bare numeral phrase carries an unvalued quantificational feature in the null D, and its unvalued feature is valued by the corresponding existential you marker, Asp, and/or Mod heads through (multiple) agreement. We argue that the proposed feature agreement mechanism can improve upon the (Extended) Mapping Hypothesis (Diesing 1992; Tsai 1999, 2001) under the Minimalist Program.

Keywords: Chinese (Mandarin), Agreement, Bare Numeral NP, Minimalism, Syntax-Semantics Interface, Mapping Hypothesis

Short title: Bare Numerals in Minimalism
1. Introduction

Consider the following English sentence, which is ambiguous between (1a) and (1b):

(1) Three people cannot play the game.
   a. ‘The game (e.g., tennis) is not designed to be played by three people.’
      [Referring to the number of players]
   b. ‘Three people (e.g., notorious cheaters) are such that they are not allowed to play
      the game.’ [Referring to certain individuals]

The semantic ambiguity can be attributed to the LF scope interactions between the bare
numeral phrase (three people) and the negative modal auxiliary verb (cannot). Therefore,
when the numeral subject three people takes a lower scope than the modal auxiliary, it yields
the reading in (1a), which makes reference to the number of players in the game (i.e. ‘It is not
allowed in general that three people play the game’). On the other hand, if the numeral
subject three people takes a higher scope than the modal auxiliary, the reading in (1b) is
obtained (i.e., ‘There are three people such that they are not allowed to play the game’).
Adopting the terminology in Audrey Li (1998), we will refer to the former as the quantity
(q)-denoting reading, and the latter as the individual (i)-denoting reading.

Li (1998) correctly points out that the distinction between the two types of bare
numeral indefinites can be clearly drawn by whether they bring about an existential meaning
(through entailment or presupposition).¹ That is, while the q-denoting bare numeral NP only
involves quantity information, the i-denoting one infers the existence of three individuals (in
the actual/evaluated world). Therefore, without any specific three people in mind, a speaker
may utter (1) with the meaning of (1a), and the rule applies to any normal game-playing
situation. On the other hand, when a speaker utters (1) with the i-denoting reading (1b), the
speaker bears in mind certain three people, and the rule only applies to them. The existential meaning contrast is attested in (2), where the existence of three people can be negated in the case of q-denoting reading (2a), but it cannot in the case of the i-denoting reading (2b):

\[(2) \quad \text{a. Three people can finish the job, (but unfortunately, there are no three people).} \]
\[\text{b. Three people have arrived, #(but unfortunately, there are no three people).} \]

Falsifying the existence of three people in (2b) yields a semantic contradiction. However, falsifying the existence of three people in (2a) does not degrade the judgement. Of course, it may be the case that there are three people in the situation (and they are about to finish the job), but it is not entailed or presupposed by the speaker when (2a) is uttered.

The contrast becomes even more interesting when Chinese data are concerned. In Chinese, a rather transparent scope marking strategy is employed in the preverbal (subject or topic) position (Huang 1982, 1990; Cheng 1991; Li 1998; Tsai 1999, 2001, among others). Unlike (1), the bare numeral subject in Chinese (3a) does not yield a semantic ambiguity, and it is always interpreted as having a lower scope than the negative modal auxiliary *bu-neng* ‘cannot’. That is, only a q-denoting reading is available. On the other hand, if the bare numeral subject has an i-denoting reading, a surface scope marker *you* (which literally means *have* or *exist*) is required to make the sentence grammatical by providing the existential closure to the preverbal subject phrase, as in (3b).

\[(3) \quad \text{a. San ge ren bu-neng canjia bisai.} \]
\[\text{Three CL person NEG-can join game} \]
\[\text{‘The game is not designed to be played by three people.’} \]
When the object is fronted to the preverbal position, the same you-marking strategy is employed. However, if the fronted object has a q-denoting reading, the you marker cannot appear (4a). The you marker is obligatory only when the fronted object has an i-denoting reading (4b):

(4) a. [San ge daren], motuoche ji-bu-xia e.
   three CL adult motorcycle fit-not
   ‘The motorcycle cannot carry three adults (in general).’

b. [* (You) san ge ren], Zhangsan mei jian-guo e.
   have three CL person Zhangsan not see-EXP
   ‘There are three people such that Zhangsan has never met them.’

The you-marking rule, however, does not apply to the bare numeral phrase in the postverbal (object) position. Nevertheless, the q-denoting and i-denoting distinction is maintained:

(5) a. Q-denoting:

   Zhangsan xuyao san ge laoshi laixie tuijian han.
   Zhagnsan need three CL teacher to write recommendation letter
   ‘Zhangsan needs three teachers to write him recommendations.’

   ⇒ However, he does not have three teachers.
b. I-denoting:

\[Zhangsan\ qing-le\ san\ ge\ laoshi\ lai\ taolun\ wenti.\]
Zhangsan invite-PERF three CL teacher to discuss problem
‘Zhangsan invited three teachers (to discuss the problem).’
⇒ #However, he does not have three teachers.

As can be inferred from the contrast above, the sentences that have the q-denoting reading generally contain a certain modal flavor. Indeed, Dylan Tsai (1999, 2001) observes that the q-denoting reading is typically restricted to the following environments:²

(6) Environments that may give rise to the q-denoting reading (see Tsai 2001: 146):

a. V-de/bu-V constructions

\[San\ ge\ ren\ chi-de-wan\ wu\ wan\ fan.\]
three CL people eat-can-finish five bowl rice
‘(Generally speaking), three people can finish five bowls of rice’

b. Modal constructions

\[San\ ge\ xuesheng\ keyi/yingai\ jiao\ shi\ fen\ zuoye.\]
three CL student can/should hand.in ten CL assignment
‘Three students should hand in ten assignments (as an order)’

c. Enough-constructions

\[San\ tai\ che\ gou\ zuo\ shi\ ge\ ren.\]
three CL car enough sit ten CL people
‘Three cars are/is enough to carry ten people.’
d. (Generic) characterizing sentences

San zhi yazi you liu zhi chibang.

three CL duck have six CL wing

‘Three ducks have six wings.’

Notably, when the you marker occurs in these constructions, the bare numeral phrase associated with you must be interpreted as i-denoting, but not as q-denoting:

(7) Contra (6a) [fronted object with the you marker = i-denoting; subject = q-dentoing]

You wu wan fan, san ge ren chi-de-wan e,i

have five bowl rice three CL person eat-can-finish

‘There are five bowls of rice such that (any) three people are able to finish them.’

(8) Contra (6b) [subject with the you marker = i-denoting; object = q-denoting]

You san ge xuesheng keyi jiao shi fen zuoye.

have three CL student can hand.in ten CL assignment

‘Three students are such that they are able to hand in ten assignments.’

Thus, the distributions of the i-denoting and the q-denoting readings can be characterized by the generalizations in (9):

(9) a. In the preverbal position, the bare numeral phrase always has the i-denoting reading if associated with the you marker. Without the you-marker, the bare numeral phrase may obtain the q-denoting reading in the syntactic environments in (6).
b. In postverbal positions, the reading of the bare numeral phrase is dependent on its environment. The q-denoting reading is obtained in the syntactic environments in (6).

At this point, some questions can be raised: (i) Why do the environments in (6) not require the you marker in the preverbal position, and why do these environments give rise to the q-denoting reading? (ii) How do we formalize the correlation between the reading of the bare numeral phrase and its syntactic environment? These questions will guide the lines of inquiry in this paper.

To foresee the proposal, we observe that the q-denoting environments in (6) contain the lower modals, including the generic, deontic, and circumstantial modals (also referred to as the root modals in Kratzer 1981, or the modals below T[ense] in Cinque 1999), in contrast to the higher epistemic modals (beyond T), while the i-denoting contexts generally contain an aspectual marker (for the postverbal bare numeral) and the you marker (for the preverbal bare numeral). It is then argued that, aside from the you marker, which provides an existential force for the preverbal i-denoting bare numeral phrase through presupposition, the existential force of the postverbal one is a byproduct of the actuality entailment (Bhatt 1999). That is, the actuality of the event implies the actual existence of the event participants. Generalizing Bhatt (1999), we attribute the existential force to the semantics of the middle (viewpoint) aspect (Klein 1994; Klein et al. 2000; Smith 1991; Lin 2003, and others), which characterizes a particular event time (or the temporal interval of the event) in relation to the reference time and utterance time. The middle aspect therefore ensures the existence of the event, along with its event participants (i.e., the bare numeral phrase). On the other hand, the lower modals do not associate the event to a specific time/location, but rather, they describe a generic statement that holds across various times/locations (Carlson 2008). Therefore, the speaker
does not have to commit herself to the existence of the event participants in a given event time frame. The correlation between the aspect-modal elements and the readings of the bare numeral NP indicate that the interpretation of the indefinite NP actually hinges on the verbal (functional) categories, as suggested by the Mapping Hypothesis developed a few decades ago (Diesing 1992). Nevertheless, we will adopt an agreement-based analysis, which represents a theoretical improvement over the traditional mapping mechanism, especially in view of the Minimalist Program (Chomsky 1995, 2000, 2001).

The paper is organized as follows. Section 2 discusses two previous approaches that deal with the two types of indefinites in Chinese. Section 3 concerns how the existential meaning (and the lack thereof) is correlated to the meanings of aspect and modal elements. Section 4 develops a Minimalist agreement-based analysis of the bare numeral phrase in Chinese. It will also be demonstrated how different readings are derived through (multiple) feature agreement between verbal and nominal domains. Section 5 concludes the paper.

2. Two Previous Approaches

In this section, we review the analyses in Li (1998) and in Tsai (1999, 2001). The with-in approach in Li (1998) argues that the two types of indefinites have different internal structures. Q-denoting indefinites are projected as NumP (D is not projected), and i-denoting indefinites as DP. On the other hand, extending the Mapping Hypothesis in Diesing (1992), Tsai (1999, 2001) approaches the question from with-out by looking into the licensing environments of different types of indefinites. Nevertheless, both the NumP approach and the mapping approach are not immune from certain undesired consequences against the Minimalist Program (Chomsky 1995, 2000, 2001), especially regarding the Bare Output Condition and the Inclusiveness Condition. Insights from earlier analyses can be preserved, however, once we adopt an agreement-based analysis.
2.1  *DP and NumP: Li (1998)*

Li assumes the hypothesis that referentiality (the ability to refer to individuals) is directly correlated with the projection of D, and proposes a rather straightforward way of capturing the difference between the two readings, namely, through their underlying syntactic structures. Li proposes that the q-denoting bare numeral simply does not project to DP, but stay as Number Phrase (NumP), as shown in (10a). On the other hand, the i-denoting bare numeral is a referential expression, so it is a Determiner Phrase (DP) that contains a null D, as shown in (10b):

\[(10)\]

(a) Quantity-denoting Indefinites

\[
[NumP \text{San} \ [CLP ge \ [NP \text{xuesheng}]]] \ chi [NumP \text{shi} \ \text{wan} \ \text{fan}].
\]

\[\text{three CL student eat ten bowl rice}\]

‘Three students eat ten bowls of rice.’

(b) Individual-denoting Indefinites

\[
You[\text{DP} D_{null} \ [NumP \text{san} \ [CLP ge[NP \text{xuesheng}]]] \ chi-le \ [\text{DP} \text{shi} \ \text{wan} \ \text{fan}].
\]

\[\text{have three CL student eat-Asp ten bowl rice}\]

‘Three students are such that they ate ten bowls of rice.’

Despite its simplicity, the analysis in fact induces some undesired theoretical implications. Li adopts a representationalist view in which the phrase structure is sensitive to its linguistic contexts. Therefore, DP is not projected in the q-denoting contexts (i.e., the environments in (6)), and DP is projected when the linguistic contexts are i-denoting. However, it is not always clear what constitutes a q-denoting context, and how the semantic notion may affect the syntax of DP, especially when c-selection is always assumed to be a strictly local
phenomenon (Grimshaw 1979, 2000). Consider an analogous scenario, where an ECM-verb selects IP as its complement (with C not being projected), and a non-ECM verb selects CP. The selections are strictly local between a verb and its phrasal complement:

(11)  a. \([V_{ECM} \mbox{ IP} \ldots]\]
    b. \([V_{non-ECM} \mbox{ CP} \ldots]\]

The strict locality of selection, however, is loosened in Li’s analysis. In both sentences in (10), for example, the same verb *eat* is involved, yet the bare numeral complement would either be NumP or DP, and the selection should depend on the context of the entire sentence. Not only is the selection non-local, but it also involves a looking-ahead problem. A possible solution to the problem might be to assume that nominal arguments are freely projected as NumP or DP, and verbs may freely select either type of complements. The unwanted readings will then be filtered out at the relevant interface level. Although this alternative might be maintained in a non-derivational model, it nevertheless suggests a theoretical position that moves away from the derivational model, namely, the Bare Output Condition in the Minimalist Program (Chomsky 1995, 2000, 2001), the spirit of which is to minimize the derivational products by eliminating the ones that will be illegible to the interfaces during the course of derivation. As made explicit in Frampton and Gutman (2002), the ‘optimal design’ of syntax is subject to the following condition:

(12) A derivational system is optimal to the extent that the end products of its derivations meet the interface requirements, with the need for filtering out defective products kept to minimum (p. 96).
This potential problem of Li’s analysis can be overcome if we assume that i-denoting and q-denoting bare numerals are uniformly DPs equipped with a null D, whose interpretations (and the relevant LF features) are unvalued, and therefore need to be valued by some syntactic operator through agreement. In this sense, the theoretically undesired non-local selection can be replaced by feature agreements, and hence are immune from the local selection problem (see Section 4).4

2.2 Extended mapping hypothesis: Tsai (1999, 2001)

The analysis in Tsai (1999, 2001) is an effort to characterize the licensing environments of the indefinite expressions in Chinese. Following Heim (1982), Tsai treats an indefinite expression as a restricted variable that needs to be bound by a quantificational operator (through a general syntax-semantics mapping mechanism). Extending the Mapping Hypothesis in Diesing (1992), Tsai develops an Extended Mapping Hypothesis in derivational terms (13):

(13) Extended Mapping Hypothesis (Tsai 2001: 132)

a. Mapping applies cyclically, and vacuous quantification is checked derivationally.

b. Materials from a syntactic predicate are mapped into the nuclear scope of a mapping cycle.

c. Materials from XP immediately dominating the subject chain of a syntactic predicate are mapped outside the nuclear scope of a mapping cycle. A subject chain is an A-chain with its tail in a subject position.

d. Existential closure applies to the nuclear scope of a mapping cycle.

Tsai’s idea is that domains of the mapping mechanism is sensitive to syntactic derivations (such as A-movement and head-movement), which actively define the mapping cycles.
Therefore, if the head movement occurs, such as the V-to-I movement, the domain of existential closure will also be extended from VP to IP. Tsai uses the *you* marker in Chinese as evidence. First, Tsai assumes that the V-to-I movement does not apply in Chinese because of the lack of any agreement morphology. Therefore, unlike English in (14a), the nuclear scope in Chinese is not extended to IP. As shown in (14b), the result is a vacuous quantification, where the subject fails to be closed by the existential closure of V. The vacuous quantification, however, can be rescued by the auxiliary insertion of the modal *you*, as shown in (14c):

(14) a. English-type languages (V-to-I movements apply at LF) (from Tsai 2001: 139)

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IP mapping cycle

... I’ (∃x) → nuclear scope

V₁+I VP

Subj(x) t₁
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b. Chinese-type languages (V-to-I movement does not apply) [The subject variable x is not bound by an *∃*-operator]

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IP mapping cycle

... I’

I VP

Subj(x) V(∃x) → nuclear scope
```
c. Licensing the subject by \textit{you}-support

\begin{center}
\begin{tikzpicture}
  \node (IP) {IP};
  \node (ModP) [below of=IP] {\ldots ModP}
    child {node {\textit{you}$(\exists \mathbf{x})$ VP}}
    child {node {Subj$(\mathbf{x})$ V}};
\end{tikzpicture}
\end{center}

As for the q-denoting indefinites, Tsai points out that all of the environments in (6) involve modal contexts. The modal triggers the V-to-Mod movement, and the verb movement consequently extends the mapping cycle to ModP. As a result, the lower copy of the subject can be licensed by the existential closure of the nuclear scope:

\begin{enumerate}
\item[(15)]
\begin{center}
\begin{tikzpicture}
  \node (ModP) {ModP \rightarrow mapping cycle};
  \node (Mod) [below of=ModP] {... Mod' \rightarrow nuclear scope}
    child {node {\textit{V}_1 + \text{Mod}(\exists \mathbf{x}) VP}}
    child {node {Subj$(\mathbf{x})$ t$_1$}};
\end{tikzpicture}
\end{center}
\end{enumerate}

At first sight, Tsai’s proposal seems rather successful in capturing the parametric differences between English and Chinese. Nevertheless, there are non-trivial problems in Tsai’s analysis, too. On the empirical ground, it is not clear why the q-denoting bare numeral needs to be bound by the existential operator, given that they do not carry an existential meaning (see above). Theoretically speaking, the head movement is assumed to be a crucial parameter that accounts for the mapping mechanism in Tsai’s theory. However, it is unclear how and why
the head movement should carry any semantic force. If we follow the proposal in Pollock (1989), the head movement always applies to form a head chain, and the only parameter lies in whether they apply at LF or at the overt syntax. That is, the V-to-I movement applies in English at the covert syntax (inaudible on the surface form), while it applies to finite verbs in French at the overt syntax (audible on the surface form). The parameter does not bring about any LF effect in interpreting the head chain (since at LF, they are all the same) (see also Boeckx and Stjepanovic 2001 and Chomsky 2001). In this sense, Tsai’s analysis is also subject to revision if we are to adhere to the Strong Minimalist Thesis.

An additional remark is on the mapping hypothesis in general, concerning the source of the existential and/or generic operators. It is generally assumed that the operators could be given by the phrase structure, associated with certain maximal projections (e.g., VP in particular, as in Diesing 1992). Nevertheless, if we adopt the Minimalist Program as presented in Chomsky (1995) and its subsequent work, it is difficult to see how the LF operator could come from a certain phrase marker. Consider the Inclusiveness Condition, adopted in Chomsky (1995) as a core assumption of the Minimalist Program:

(16) The Inclusiveness Condition (Chomsky 1995: 225)

Another natural condition is that outputs consist of nothing beyond properties of items of the lexicon [lexical features].

Given the assumption, a Minimalist mapping mechanism should be able to attribute the LF operators to items in the lexicon, rather than to the phrase markers per se. As will become clear in the next section, we pinpoint the sources of the LF operators to the semantic meanings of middle aspects and lower modals. Therefore, pursuing a Minimalist mapping theory is not only a theoretical preference, but by doing so, we may achieve better descriptive
adequacy (by being more precise in terms of the environments that give rise to the two readings), while at the same time, develop a simpler theory that involves less theoretical apparatus (hence being more explanatorily adequate).

3. **On the Sources of the LF operators**

A perplexing question regarding the bare numeral phrase is why the i-denoting ones carry the existential meaning, while the q-denoting ones do not (recall the discussion in Section 1). Under close scrutiny, we find that the existential meaning of the i-denoting bare numeral has two sources, and none of them is a phenomenon restricted to the NP per se. For the preverbal bare numeral, the *you* marker provides the existential force through presupposition (due to the fact that *you* is an existential marker, as commonly assumed), while for the postverbal bare numeral NP, the existence is entailed by the actuality of the event. We will focus on the latter case. Consider the actuality entailments discussed in Bhatt (1999) and Piñón (2003):\(^5\)

(17) (Modified from Bhatt 1999: 186)

a. (Last night,) the machine crushed up oranges, (#but it never did).

b. The machine can crush up oranges, (but it never did).

c. The machine crushes up oranges, (but it never did).

With perfective aspect (instantiated by the past tense in English), (17a) entails that an event of orange-crushing actually happened (an actual event), but with deontic or generic modals, neither does (17b) nor (17c) carry such an entailment, mainly because the speaker simply describes a circumstantial consequence (if the machine works fine and we have regular oranges, then the machine is able to crush oranges) or a regular pattern of events (if the machine works fine and we have regular oranges, then the machine regularly crush oranges)
in the ideal possible worlds (Carlson 2008), and it does not matter whether the event actually occurs or not. Conceptually, it is plausible to relate the existential force of the i-denoting reading to the actuality entailment. The idea is that the actual existence of the event participants hinges upon the actuality of the event (whether it is an actual event or not). That is to say, the existential force can be viewed as a by-product of the actuality entailment. Consider the following:

(18)  
   a. (Last night,) the machine crushed up oranges, (#but there weren’t any oranges).
   b. The machine can crush up oranges, (but there is no orange).
   c. The machine crushes up oranges, (but there is no orange).

Like actuality entailments of the event-level in (17), the existential meaning is only found with the sentence with the perfective aspect in (18a), while in the modal contexts (18b-c), no such entailment is observed. Bhatt (1999) argues that the actuality entailment is brought about by the perfective aspect, and on the other hand, imperfective aspects (related to a generic operator by default) do not carry such an entailment. In Bhatt’s original analysis, his discussion is limited to sentences with ability modal and (im)perfective aspect. Nevertheless, based on the empirical observation from Chinese, we will generalize his account and argue that each of the middle (viewpoint) aspects may carry an existential operator responsible for the existential force (for the postverbal bare numeral), while the generic operator is associated with lower modals like generic, deontic, circumstantial, or other root modals (Bhatt 1999; Hacquard 2006, 2009; Kratzer 1981, 1989; Portner 2009). As a result, the sources of the LF operators are the functional lexical items in the lexicon, including the you marker, middle aspects, and root modals, and they do not simply arise from the phrase markers (like VP or
IP). If so, we may maintain the insights of the mapping hypothesis without violating the Inclusiveness Condition.

Let us start with the middle (viewpoint) aspects. According to Smith (1991) and Klein (1994), the function of the middle aspect is to introduce a specific “reference time frame” (called viewpoint in Smith 1991 and topic time in Klein 1994), and the time frame further interacts with the event time frame (depending on how the event is ‘viewed’ by the reference frame), and the reference time bridges the event to the utterance time. To illustrate, consider the following sentence with the perfective aspect (Klein et al. 2000; Lin 2003):

(19) Perfective Aspect

a. Zhangsan gangcai he-le yi bei kafei.

Zhangsan just drink-PERF one CL cup coffee

‘Zhangsan just drank a cup of coffee.’

b. There is a reference time frame such that a drinking event (participated by Zhangsan and a cup of coffee) is fully contained in the reference time frame, and the reference time frame is located shortly before the actual time of utterance (now).’

The perfective aspect -le introduces a unique reference time frame that contains the event time (and hence denoting the completion of the event), which is in turn located before the time of utterance (the present speech time by default), giving rise to the past tense interpretation. The actual occurrence of the event therefore hinges on the perfective aspect. As for the other two middle aspects in Chinese, -zhe and -guo, we again follow Klein et al (2000)’s analysis:
(20) Progressive Aspect

a. Zhangsan (zhengzai) he-zhe yi bei kafei.

Zhangsan now drink-PROG one CL cup coffee

‘Zhangsan is drinking a cup of coffee (now).’

b. There is a reference time frame such that it is contained in the time frame of the drinking event (participated by Zhangsan and a cup of coffee), and the reference time frame coincides with the utterance time (now).

(21) Experiential Aspect

a. Zhangsan he-guo yi bei kafei.

Zhangsan drink-EXP one CL cup coffee

‘Zhangsan (has) had a cup of coffee (before).’

b. There is a reference time frame such that the time frame of the drinking event (participated by Zhangsan and a cup of coffee) is located before the reference time frame, and the reference time frame is in turn located before or overlapped with the utterance time (now).

The different aspectual meanings among middle aspects lie in how the event is ‘viewed’ by the reference time frame, but all of the middle aspects are able to entail the existence of the event, alongside the existence of the event participants, a cup of coffee.

There is a catch here, however. The existential force from aspect only affects the postverbal bare numeral phrase, but not the preverbal bare numeral phrase (although in principle, the preverbal argument, such as agent, is also a participant of the event). This is evidenced by the fact that the preverbal bare numeral phrases requires the you marker, which is an existential marker that is able to trigger the existential presupposition (Huang 1982,
1990; Cheng 1991; Tsai 1999, among others). The distinction between the existential entailment and the existential presupposition can be observed in the negative counterpart of the proposition (Horn 1969; Karttunen and Peters 1979, and many others). An entailment is falsified by the negation of the proposition (22), while a presupposition (or conventional implicature) survives the negation (23):

(22) Zhangsan mei-you he [san ping jiu], (yinwei zhi-you liang ping).
    Zhangsan not-have drink three CL_bottle wine because only-have two CL_bottle
    ‘Zhangsan did not drink three bottles of wine (because there were only two bottles).’
    ⇒ The existence of three bottles of wine can be falsified.

(23) [You san ping jiu] Zhangsan mei-you he, (#yinwei zhi-you liang ping).
    have three CL_bottle wine Zhangsan not-have drink because only-have two CL_bottle
    ‘There were three bottles of wine that Zhangsan did not drink (#because there were
    only two bottles).’
    ⇒ The existence of three bottles of wine is never falsified.

We will argue that the reason why the influence of aspect is restricted to the postverbal bare numeral phrase is due to the syntactic proper, which will be discussed at length in the next section. Simply put here, the preverbal subject phrase (or the topicalized object phrase) is not generated under the AspP, and therefore, the existential feature carried by Asp is not able to value the preverbal bare numeral phrase. The analysis thus accounts for why the preverbal bare numeral phrase must resort to the you marker if it is interpreted as i-denoting.

On the other hand, for q-denoting bare numeral phrases, sentences with generic, deontic, abilitative, or circumstantial modals (or root modals) are generally in the form of a generic statement about a rule or patterns of events in prototypical possible worlds (Bhatt
That is to say, the root modal elements are all associated with an intensional generic operator, which introduces a universal quantification over prototypical possible worlds, and a hidden conditional connective (Heim 1982), as illustrated in (24)-(26). For simplicity, the proper accessibility conditions (Kratzer 1981) between worlds are assumed:7

(24) Generic
   a. Yi zhi shuita yi tian (hui) chi shi tiao yu.
      one CL otter one day GEN eat ten CL fish
      ‘An otter eats ten fish per day.’
   b. (GEN > an otter eats ten fish per day): For all x: a prototypical otter and for all y: a prototypical amount of ten fish and for all z: a regular day, if everything is normal (an otter is not sick and there are enough fish, etc.), then x eats y per z.’

(25) Deontic modal
   a. (Wo xiwang) yi ge ren keyi he san bei kafei.
      I hope one CL person can drink three CL cup coffee
      ‘(I hope that) a person is allowed to drink three cups of coffee.’
   b. (GEN > a person can drink three cups of coffee): For all x: a typical person (who drinks coffee) and for all y: three regular cups of coffee, if my hope is satisfied and the rule is obeyed, then x drinks y.’

(26) Abilitative/Circumstantial modal
   a. Zhangsan he-de-wan san ping jiu.
      Zhangsan drink-can-finish three CL bottle wine
      ‘Zhangsan is able to finish drinking three bottles of wine.’
   b. (GEN > Zhangsan can finish three bottles of wine): For all x: three regular bottles of
wine, if every condition is normal (Zhansan is healthy, the wine does not go sour, etc.), then if Zhangsan drinks x, he is able to finish x.’

Putting the detailed semantic formalism aside, the intuition behind the current proposal is that these modal-equipped sentences characterize the sentence in a generic sense. This means that the participants of the event are also non-specific, but are generic and prototypical. Take (26) for example. The statement simply concerns the speaker’s judgement regarding Zhangsan’s ability to finish three bottles of wine in typical situations (so that Zhangsan is not sick, the size of the wine bottle is regular, the wine is still fresh, and so on). Therefore, in these sentences, the speaker is not committed to the existence of three specific bottles of wine, unlike what we have seen in the aspectual sentences. The generic flavor of the q-denoting bare numeral phrase can be evidenced by the fact that it admits exceptions and can be modified by a generic adverb like tongchang ‘often’ without substantially changing the meaning, which are signature properties of generic nouns (27a) (Krifka et al. 1995). Likewise, (27b) exhibits the same properties, and it allows for exceptions that are not included in the prototypical/normal worlds (so that the coffee may tastes too bitter, or the size of the coffee is ridiculously large, and so on):

(27) a. Gou (tongchang) you weiba, danshi na zhi gou mei-you.
    dog often have tail but that CL dog not-have
    ‘Dogs (often) have tails, but that particular dog does not.’

b. Zhangsan (tongchang) he-de-wan san bei kafei, danshi ta
    Zhangsan often drink-can-finish three cup coffee but he
    he-bu-wan zhe san bei (chaoku/da-bei de kafei).
    drink-not-finish this three cup super bitter/large-cup DE coffee
‘Zhangsan can (usually) finish three cups of coffee, but he cannot finish these three cups of coffee (that are ridiculously bitter/large).’

Another structural similarity between generic and the lower modal is that neither of them is compatible with middle aspectual markers in Chinese (Lin 2004). Consider the following:8

(28) a. Generic

Xiong hui dongmian(*-le/*-zhe/*-guo) si ge yue.
bear GEN hibernate(-PERF/PROG/EXP) four CL month

‘Bears hibernate for four months.’

b. Deontic modal

Zhangsan yinggaikeyi he(*-le/*-zhe/*-guo) kafei.
Zhangsan should/can drink(–PERF/PROG/EXP) coffee

‘Zhangsan should/can drink coffee.’

c. Abilitative modal

Zhe ge xiangzi zhuang-de-xia(*-le/*-zhe/*-guo) shi ben shu.
this CL box contain-can-fit(–PERF/PROG/EXP) ten CL book

‘This box is able/enough to contain ten books.’

Summarizing the discussion so far, we are able to attribute the existential or generic operator that binds the bare numeral indefinites to the functional lexical items, including the you marker (for preverbal i-denoting bare numerals), the middle aspect markers (for postverbal i-denoting bare numerals), and the lower modals (for q-denoting bare numerals). The analysis proposed here not only derives the same cyclic effect of Tsai’s Extended Mapping Hypothesis without involving head movements, but it also improves upon the traditional Mapping
Hypothesis in a substantial way. First, the analysis proposed here does not need to assume that phrase markers (VP and IP) are the sources of the LF operators, an assumption that remains descriptive and violates the inclusiveness condition in the Minimalist Program. On the other hand, the LF operators come from the functional lexical items, and the choice of the existential or generic operator is based on the meanings of these items.9 The analysis here also allows us to develop a Minimalist syntax-semantics mapping theory. To this end, we will formulate an agreement-based analysis in the next section.

4 Syntax of Bare Numerals in Chinese

In this section, we argue for a unified syntactic analysis of the two types of bare numeral readings in Chinese. For theoretical reasons, we adopt the feature agreement mechanism originally proposed in Chomsky (1995, 2000), and later expanded in Hiraiwa (2005), Chomsky (2008), and Zeijlstra (2004, 2012). Ken Hiraiwa (2005) proposes that the probe-goal relation can be a one-to-many relation or a many-to-one relation, or multiple agreement, and Zeijlstra (2004, 2012) proposes that the probe-goal relation can be symmetric (that is, both agree and reversed agree are admissible).10 We propose that the you marker and the middle aspect in Chinese both carry an existential quantificational (or referential) Q-feature that is interpretable to the LF interface, namely [∃], and the lower modal (which requires a null aspect) with an interpretable generic feature [Gen]. In its c-commanding domain, the valued feature may probe and value the unvalued quantification feature [uQ] carried by the covert D of the bare numeral DPs, given the assumption that the bare numerals in Chinese function as variables (Heim 1982; Tsai 1999). The unvalued D variables are therefore subject to the feature agreement mechanism, schematized in (29):
(29)  a. Postverbal i-denoting bare numeral: ...Asp[₃] V D₁[uQ]
    b. Preverbal i-denoting bare numeral: you[I] D₁[uQ] V...
    c. q-denoting bare numeral: Modal[Gen]...D₁[uQ] ... Asp[o] ... D₂[uQ]

4.1 Deriving the q-denoting reading from multiple-agreement

Let us first consider the case where both of the subject and the object have q-denoting readings. Recall that the environments that give rise to the q-denoting reading generally involve a null aspectual marker and a root modal element. Suppose that the null aspect does not carry a quantificational feature. The null D of the postverbal object fails to receive a value from Asp, and therefore the null D must seek for the next closest head with a valued [Q], which is Mod. Meanwhile, the subject null D also carries an unvalued Q-feature, which can be valued by Mod, being the closest head with a valued Q-feature. As a result, the subject and object Ds are both valued by the Q-feature [Gen] in Mod through multiple agreement (see Hiraiwa 2005 and Zeijlstra 2004), and both D's are valued with a generic feature that allows them to obtain the q-denoting reading, as in (30). Note that under the multiple agreement model (Hiraiwa 2005; Chomsky 2008), Full Interpretation requires that a Goal remains active until the closest Probe enters agreement with it. In (30), since D₁ and D₂ are both unvalued (they are both Goals that await feature valuation), and the null Asp is a deficient Probe, the unvalued Goals (D₁ and D₂) remain active until the closest Probe (Mod) assigns them with a value. Essentially, we obtain a similar result of unselective binding (see also Zeijlstra 2004 for a similar approach in accounting for the negative concord):¹¹

(30) [ModP  Mod [vP [D₁ san ge ren] [AspP  Asp[vP chi [D₂ wu wan fan]]]]
    [Gen] [uQ] three CL person [ø] eat [uQ] five bowl rice

'Three people eat five bowls of rice.'
Next, let us turn to the ungrammaticality of (31), where the q-denoting subject cannot receive a proper Q-feature valuation.\textsuperscript{12}

\begin{enumerate}
\item[(31)] a. \textsuperset{ModP} \textit{San ge ren} \textsuperset{AspP} \textit{chi-wan-le wu wan fan.]
\begin{tabular}{cccc}
three & CL & person & eat-finish-PERF five & CL & rice \\
\end{tabular}
\textit{Intended: ‘(Any) three people ate and finished some five bowls of rice.’}

b. \textsuperset{ModP} \textsuperset{Mod[\emptyset]} \textsuperset{D1:uQF} \text{three-person} \textsuperset{AspP} \textsuperset{Asp[\exists]} \textsuperset{D2:uQF} \text{five-bowl-rice]
\end{enumerate}

Being an episodic sentence, (31) does not contain a root Mod that can supply D\textsubscript{1} with the relevant Q-feature value. Since the subject is out of the c-commanding domain of the potential feature-supplier Asp, the latter is not able to probe the unvalued feature in D\textsubscript{1}, either. The sentence therefore crashes at LF.

4.2 Deriving the i-denoting reading

As we move on to the i-denoting reading, the syntax of the \textit{you} marker becomes crucial. We argue that the \textit{you}-phrase is in fact introduced in an independent clause, and it is coindexed with the preverbal or postverbal gap \textit{e} in the structure, as shown in (32).\textsuperscript{13}

\begin{enumerate}
\item[(32)]
\begin{tabular}{c}
\textit{XP} \\
\textit{YP} \\
\textit{ZP} …
\end{tabular}
\begin{tabular}{c}
you \textsuperset{D-NumP} \textsuperset{DP1 DP/e] \\
AspP
\end{tabular}
\begin{tabular}{c}
Asp V \textsuperset{DP2 DP/e] \\
\end{tabular}
\end{enumerate}
Putting aside the categorial statuses of XP, YP, and ZP for now, this structure is in fact a favorable move, given the scope interactions and other properties between the you subject (YP) domain and the ZP. Consider the negation scope in the following minimal pair:

(33) a. San ge ren bu-keneng tai-de-qi shi xiang shu.

three CL person not-possible move-can-up ten CL box book

‘It is impossible that three people can carry ten boxes of books.’

([not possible] > [three people carry ten boxes of books])

b. [You san ge ren] [ei] bu-keneng tai-de-qi shi xiang shu.

have three CL person not-possible move-can-up ten box CL book

‘There are three people such that it is impossible for them to carry ten boxes of books.’

([three people] > [not possible] > [carry ten boxes of books])

The modal negation in (33a) negates the whole proposition, showing that the modal negation can take scope over the whole sentential domain (a CP), including the subject; however, in (33b) the scope of the modal negation is only limited to the ZP, excluding the you-subject part. This scope relation is transparent if we assume the structure in (32). Therefore, a negation in the main predicate can at most take ZP in its scope, but not YP. Furthermore, in the you construction, YP and ZP can take their own epistemic modal adverbials, as in (34), yet this is not possible in the sentence with only one CP domain, as in (35):

(34) [CP Keneng you liang ge qiangshou] [CP [ei] dagai kai-le liang qiang].

possibly have two CL shooter probably fire-Asp two shot

‘There possibly were two shooters who probably fired (at least) two shots.’
These facts suggest that YP and ZP in (32) be treated as separate propositional domains. Let us assume that YP and ZP are both CPs, and YP is adjoined to ZP:\textsuperscript{14}

\[(36) \quad \mathrm{CP}_1=\mathrm{XP} \]
\[\mathrm{CP}_2=\mathrm{YP} \quad \mathrm{CP}_1=\mathrm{ZP} \]
\[\quad \mathrm{Asp} \quad \mathrm{V} \quad [\mathrm{DP}_2 \mathrm{DP}/e] \]

With this structure in mind, the i-denoting reading of the you-DP is always independent of the bare numeral phrase in the matrix clause. Consider (37) and (38). The former shows that the bare numeral object (i.e. \textit{ten assignments}) can be bound by the modal in the matrix clause (with the q-denoting reading), while the you-DP obtains the existential force (that gives rise to the i-denoting reading) from the existential you marker:

\[(37) \quad \text{a. } [\text{You} \quad \text{san} \quad \text{ge} \quad \text{xuesheng}]_{\text{i}} \quad [\text{e} \quad \text{neng} \quad \text{xie} \quad \text{shi} \quad \text{fen} \quad \text{zuoye}]_. \]
\[\text{have three CL student} \quad \text{can write ten CL assignment} \]
\[\text{‘There are three students such that they are able to write ten assignments.’} \]

\[\text{b. } [\mathrm{CP}... \quad \text{You}_{[3]} \quad [\mathrm{D}_{[\text{uQ}] \text{three-student}}]_{[\mathrm{CP}...[\mathrm{ModP} \quad \text{can}_{[\text{Gen}]...proi} \quad \text{AspP} \quad \text{Asp[ø]} \quad \text{V}[\mathrm{D}_{[\text{uQ}] \text{ten-assignments}}]]]]] \]
Let us consider another scenario, where the subject and the object bare numeral phrases are both interpreted as i-denoting. In this case, their Q-features are valued by the you marker and the aspectual head, respectively:

(38) a. \[ \text{[you}\ san\ \text{ge} \ xuesheng_i]\ \text{[CP...} e_i \ [\text{Asp}\ jiao-le\ \text{shi}\ \text{fen}\ \text{zuoye}]]\]

have three CL student turn.in-Asp ten CL assignment

‘There are three students such that they turned in ten assignments.’

b. \[
\text{[CP...}\ \text{You}[\exists]\ \text{D}_1[uQ]\text{three-student}]\ \text{[CP...} \text{Mod}[\varnothing]\text{...}[\text{Asp}\ \text{Asp}[\exists]\text{...}\text{D}_2[uQ]\text{ten-assignments}]]
\]

Summarizing the discussion, the interpretations of the bare numeral phrases and the sources of relevant features can be schematized as follows:\textsuperscript{15}

(39) Syntax-semantic distributions of the bare numeral phrases

<table>
<thead>
<tr>
<th>Subject/Preverbal</th>
<th>Object/Postverbal</th>
<th>Source of Q-feature</th>
<th>Ex.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. q-denoting</td>
<td>q-denoting</td>
<td>Modal (multiple agreement)</td>
<td>(30)</td>
</tr>
<tr>
<td>b. q-denoting</td>
<td>i-denoting</td>
<td>N.A. (vacuous quantification)</td>
<td>(31)</td>
</tr>
<tr>
<td>c. i-denoting</td>
<td>q-denoting</td>
<td>\text{You} (for subj.) / Modal (for obj.)</td>
<td>(37)</td>
</tr>
<tr>
<td>d. i-denoting</td>
<td>i-denoting</td>
<td>\text{You} (for subj.) / Asp (for obj.)</td>
<td>(38)</td>
</tr>
</tbody>
</table>

5. Conclusion

A unified analysis of Chinese bare numeral indefinites has been proposed. We argue that bare numeral phrases are uniformly DP in their syntax, where the null D carries an unvalued feature that is later valued by the you marker, the middle aspects, or the root modals. The former two elements give rise to the i-denoting reading, by virtue of carrying the
quantificational $\exists$–feature, whereas the latter brings about the q-denoting reading with an inherent $[\text{Gen}]$-feature. By attributing the relevant Q-features to items in the lexicon, and by employing the (multiple) feature agreement mechanism, an agreement-based mapping analysis has been developed that not only improves upon the traditional mapping hypothesis, but is also more compatible with the Minimalist Program.

**References**


Dissertation), MIT, Cambridge, MA.


Tsai, C.-Y. E. (2016). On "quantity" number phrases in Mandarin. Talk given in Academia
Sinica, Taiwan. Nov. 28th, 2016.


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**Endnotes**

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1 As will become clear in Section 3, we will argue that the existential meaning of the preverbal bare numeral NP comes from presupposition (triggered by the you marker), and that of the postverbal bare numeral comes from entailment (indirectly from the actuality
entailment of the event). A reviewer asks why the i-denoting reading, in addition to the existentiality, can also acquire a “specific” reading (i.e., a wide-scope reading of the existential closure). While we have little to say about the semantics of specificity in this paper, the availability of the specific reading for the existential NP (e.g., *some* NPs in English) is not uncommon (see Abusch 1994; Reinhart 1997; Winter 1997; Matthewson 1999, among others). We assume that the semantic mechanism that gives rise to the specificity of the existential NP is also responsible for deriving the specificity of the bare numeral in Chinese. What is crucial here is that the bare numeral phrase must be interpreted as i-denoting in order to obtain the existential force, and the specificity that derives from it.

2 The conditional sentence is also listed in Tsai (1999, 2001) as an environment that allows for the q-denoting reading. In this paper, we would leave out conditional sentences, as they involve complication regarding quantifier absorption (Heim 1982; Baker and Travis 1997, among others). We will leave it for future research.

3 An anonymous reviewer asks why the fronted object in (7a) cannot be valued in the underlying object position, as in (4). We assume that the fronted object (7a) is in fact base-generated in the you-CP (and valued by the closest Probe you); see (36), and the gap in the following CP is filled with an empty noun, or a null constant in the sense of Rizzi (1997), which is co-referenced with the apparently fronted argument.

4 Li’s (1998) analysis can be maintained under a representational model. The theoretical challenge here is to develop an analysis that is compatible with the strong derivational model.

5 The original discussion of actuality entailments in Bhatt (1999) involves the ability modal (*be able to*), and Bhatt argues that the ability modal is in fact ambiguous according to the aspect of the sentence. With perfective aspect, the ability modal behaves more like a verbal predicate (*to manage to*), rather than a true modal verb. Here, we use the term actuality entailment in a generalized sense (whether a sentence entails actual occurrence of the event),
without involving ability modal in every case.

For details, readers are referred to the theory of Basic Time Concept in Klein (1994) and Klein et al. (2000), whose analysis of Chinese aspects is adopted here. For the formal semantics of the middle aspects in Chinese along the same line, see Lin (2003).

Tsai (2001: 148) also relates the q-denoting reading to the Gen operator (in order to account for the free choice reading), in addition to the spurious $\exists$-operator. More precisely, we propose that the generic operator is inherent in the lower modals, as in Bhatt (1999) and Hacquard (2006). Following the latter, we assume that the Gen operator scopes over modal (however, see Portner 2009: 209-210 for a slightly different view). The choice of the formal analysis does not concern us much here, yet the proposal that the Gen operator is inherent in the lower modals is shared by different formalisms. It is the inherent association that allows us to postulate a [Gen] feature in the Modal head in syntax.

Two apparent counterexamples are shown in the following sentences, which seem to allow the combination of a deontic modal auxiliary and a perfective aspect:

(i) Ni keyi chi-le fan zai likai zheli.
   you can eat-PERF meal then leave here
   ‘You are allowed to leave after you have a meal.’

(ii) Ta yinggai he-le liang bei kafei le.
    he should drink-PERF two CL_cup coffee SFP
    ‘(I estimate that) he had two cups of coffee.’

However, (i) actually has the following structure, which contains an adjunct clause:

(iii) [Ni keyi [(zai chi-le fan (yihou)] zai likai zheli]
     you can in eat-PERF meal after then leave here

That is, the perfective aspect is not directly under the influence of the deontic modal, but it occurs inside an independent adjunct clause. Therefore, (i) is not an exception to our
generalization, since it is still impossible to mark the main predicate (i.e. likai ‘leave’ in (i))
with an aspectual marker:

(iv) Ni keyi [chi-le fan] zai likai(*-le) zheli.
    you can eat-PERF meal then leave(-PERF) here

(ii) is not a counterexample, either. The modal auxiliary yinggaí here can only be interpreted
as an epistemic modal (related to the speaker’s belief or knowledge), but not a lower deontic
modal (related to the speaker’s intention).

9 In addition to the existential operator and the generic operator, the universal/maximal
operator dou in Chinese (Cheng 1995; Lin 1998; Xiang 2008) may also be a potential
licensor for the universal (or definite) reading of the bare numeral in Chinese, as in (i). We
thank an anonymous reviewer for pointing this out to us:

(i) San ge ren dou lai le.
    three CL person all arrive SFP
    ‘All (of the) three people have arrived.’

10 The symmetric agreement is relevant because feature valuation and interpretability are
dissociated, which extends the original proposal in Chomsky (2001) (see Pesetsky and
Torrego 2007; Zeijlstra 2012). We argue that the Q-features of the Mod and Asp are valued
but uninterpretable at LF (in terms of the referentiality), while the Q-feature in the null D is
unvalued but interpretable at LF (since DP requires a value of referentiality, in the sense of Li
1998). The unvalued yet interpretable feature on D therefore drives feature agreement in a
reversed fashion (see Zeijlstra 2012). That is, it probes the closest goal with matching valued
feature that c-commands it. We further assume that the valued feature will remain active until
it is spelt-out to LF, meaning that multiple agreements are possible (see Section 4.1).

11 Given the fact that Asp is not able to bind the bare numeral subject in Chinese, it is
plausible to assume that vP is base-generated above AspP. Empirically, the assumption might
be supported by the fact that the subject light verb like *ba* ‘HAVE/CAUSE’ cannot be aspectually suffixed, but only the main verb can, as in (i). If the subject vP were located between AspP and VP (like auxiliaries between T and V in English), it is not clear why it would not interfere with the affixation of the aspectual suffix:

(i)  Zhangsan ba(*-le) dangao yao-le yi kou.

    ‘Zhangsan took a bite of the cake.’

Conceptually, the assumption maps the subject and the object to a parallel configuration with respect to AspP and ModP (and the AspP is the complement of vP in the later derivation):

(ii)  a. Subject DP:  

        \[ ModP \ Mod \ [vP \ Subject-DP \ v] \]

    b. Object DP:  

        \[ AspP \ Asp \ [VP \ Object-DP \ V] \]

The structural parallelism echoes the low demonstrative hypothesis in the nominal domain, where it is argued that D and Demonstrative are associated with NP and CLP (or #P) in a parallel fashion (and the DemP is the complement of #P in the later derivation) (Alexiadou et al. 2007):

(iii)  a. \[ DP \ D \ [CLP \ CL] \]

    b. \[ DemP \ Dem \ [NP \ N] \]

The theoretical discussion is, however, beyond the scope of this paper, and we will leave it for future research.

12 For some speakers, a bare numeral in the subject position can also have a definite reading in Chinese, subject to the familiarity and maximality conditions. In that case, we argue that there is a covert definite article in the structure (same as the definite reading of bare nouns in Chinese). Since the D is filled with a definite value, no vacuous quantification is induced.

13 We assume the second CP contains an empty argument *pro* or a true empty category, adopting Huang’s (1988) and Li’s (2014) analyses. The status of the empty category,
however, does not concern us much here.

14 We assume that the bare numeral is an internal argument of the existential predicate headed by you, and the subject of the you-CP can be a location phrase or a null expletive:

(i) Nali/pro you san ge ren likai le.
    there have three CL person leave SFP
    ‘There are three people who left.’

This analysis is reminiscent of the analysis of there-construction in Williams (1994, 2006), where there is treated as an expletive subject of the nominal predicate. Another possibility is to treat the you marker as D, as in Tsai (2004). At any rate, the domain of the existential operator is restricted to the you-phrase alone. We thank an anonymous reviewer for urging us to clarify this point.

15 There are potentially other sources of the existential operator. For example, when answering a how-many question (i) (Li 1998) and in the contrastive environment (ii) (Tsai 2016), you is optional:

(i) Q: Ji ge ren dao-le?
    how many CL person arrive-PERF
    ‘How many people arrived?’

    A: (You) san ge ren dao-le.
    have three CL person arrive-PERF
    ‘Three people arrived.’

(ii) (You) san ge ren chi-guo fan le; qita de ren hai-mei.
    have three CL person eat-EXP rice SFP other DE person yet-not
    ‘Three (of the) people have dined; others have not.’

Note that in both examples, the bare numeral phrases are associated with focus, which carries the existential operator through the existential presupposition (see Jackendoff 1972 and Rooth
1985).