The Unit Phrase in Mandarin

YU-YIN HSU
Bard College[1]

1 Introduction

Since Cheng and Sybesma (1998, 1999), the syntax, the headedness of measure words, and the semantic distinction of them (i.e., "classifiers" vs. "massifiers") have aroused great discussion. The measure words at issue refer to words that serve as a unit or measurement of nouns for counting purposes.[2] According to Cheng and Sybesma (1998), measure words can be distinguished semantically with respect to the noun that they are associated with. Count nouns refer to entities "which present themselves naturally in discrete, countable units," and mass nouns are "substances which do not present themselves" in specific units. Based on this, Chen and Sybesma divide measure words into two types: measure words like (1a) are referred as "classifier," and those like (1b) are referred as "massifier."

(1) a. liang **ben** shu
two CL book
'two books'

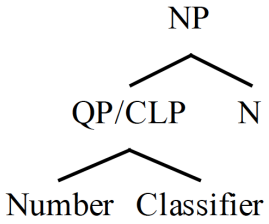
b. san **xiang** shu
three CL.box book
'three boxes of books'

Various structures have been proposed to account for Chinese nominal expressions containing a classifier/massifier: a unified left-branching structure (e.g., Huang 1982, Tang 1990, Hsieh 2008, and Her 2012, as in (2)), a unified right-branching structure (e.g., Tang 1990, Cheng and Sybesma 1999, Borer 2005, Huang, Li and Li 2009, as in (3)), and non-unified accounts that usually propose a structure like (2) for "massifier" and a structure like (3) for "classifier" (e.g., Zhang 2011, 2013, X. Li 2011, and X. Li and Rothstein 2012). In this paper, unlike the previous syntactic analyses, I argue for a different and simplified right-branching structure that can account for the syntax of the measure words in question.

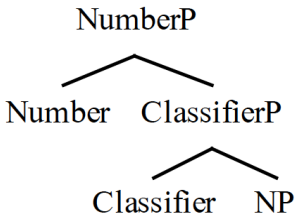
1 I benefit a lot from Steven Franks, Yoshihisa Kitagawa, and Jen Ting for discussions and comments on the earlier drafts of this paper. I also thank Peter Jenks, Line Mikkelsen, and the audience of BLS 40 for their insightful comments and suggestions. Any errors and inadequacies are exclusively my own.

2 The abbreviations of the glosses used in examples are: CL, classifier, measure word; DE, marker of modifiers of nominal expressions; PERF, perfective aspect marker; EXP, experienced aspect marker.

(2) Left-branching Structure



(3) Right-branching Structure



Before I present my analysis, there are facts that suggest the uniformity of massifiers and classifiers from a syntactic perspective. To begin, it is well known that different types of measure words (i.e., classifiers and massifiers) cannot co-occur. The examples in (4) demonstrate this point. Such examples suggest that these measure words compete for the same syntactic position.

(4) a.* liang **ben** **xiang** shu
two CL CL.box book
b.* liang **xiang** **ben** shu
two CL.box CL book

Moreover, it has been pointed out in Tang (2005), Hsiech (2008), Her (2012) and Shi (2013) that both classifiers and massifiers are compatible with the so-called "*de*-insertion," which was originally argued by Cheng and Sybesma (19999) as a syntactic difference between massifiers and classifiers.[3]

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[3] Following Tang (1990), I assume that the sequence of *number-classifier-de* (e.g., (i)) is analyzed as modifier phrase (ModP) on a par with other modifier of nominals (e.g., adjectives and relative clauses), which is different from the typical classifier structure that is discussed in this paper (e.g., (ii)), i.e., UnitP proposed in this study.

(i) [$_{ModP}$ liang bang de] [$_{NP}$ rou]
two pound DE meat
'meat that is sorted in accordance with two pounds'

(ii) [$_{UnitP}$ liang bang rou]
two pound meat
'two pounds of meat'

(5) a. yi da tiao de yu
one big CL DE fish
'one big fish'

b. yi da xiang de yu
one big CL.box DE fish
'one big box of fish'

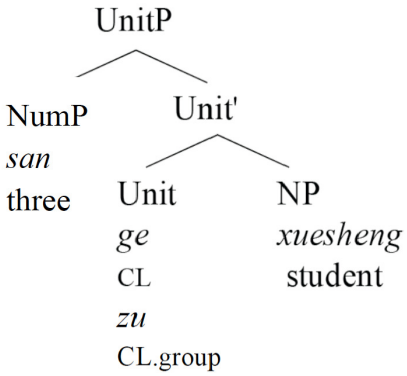
Zhang (2011, 2013) and Her (2012) also show that both classifiers and massifiers can license NP ellipsis. The examples in (6) demonstrate this point.

(6) a. Ta you san ben shu, wo you si ben ~~shu~~.
He have three CL book I have four CL
'He has three books, I have four.'

b. Ta you san xiang shu, wo you si xiang ~~shu~~.
He have three CL.box book I have four CL.box
'He has three boxes of books, I have four boxes.'

Therefore, although I acknowledge that there are several semantic differences that could be identified among the measure words at issue, such as the count-mass distinction argued in Cheng and Sybesma (1998, 1999), or interpretations of container, partitive, collective, and individuating functions that are discussed in Zhang (2011, 2013), I argue that a simplified unified right-branching structure can explain the syntax and account for the same range of data reported in the literature. As shown in (7), my proposal presents the measure words at issue as the head of a Unit Phrase (hence UnitP) dominating noun phrase (hence NP) and taking numeral phrase (hence NumP) as its specifier.

(7) Proposal: Unit Phrase



Structures similar to (7) can be found in non-unified accounts, such as Cheng and Sybesma (1998), Zhang (2011, 2013), X. Li (2011), and X. Li and Rothstein (2012). Independently, Zhang (2013) also proposes the same UnitP structure but only proposes it for measure words that express individual or individuating interpretation. However, I depart from these proposals and argue that this structure (7) alone can explain the syntactic behaviors of measure words. More importantly, unlike the previous analyses, I argue that the occurrence of Unit head changes the semantic core of the whole nominal expression, that the projection UnitP is independent of and dominates the complement NP, and that modification of adjectives within a nominal expression has to respect this structure.

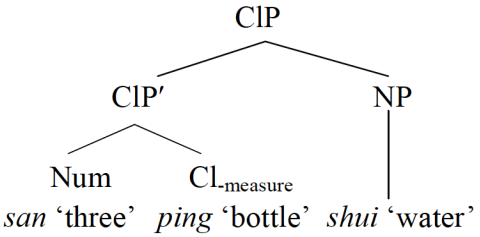
In the following sections, I discuss why I render previous proposals using left-branching structures not plausible, and why the current proposed structure (7) can account for the same set of data in a simpler way.

2 Problems in Left-Branching Proposals

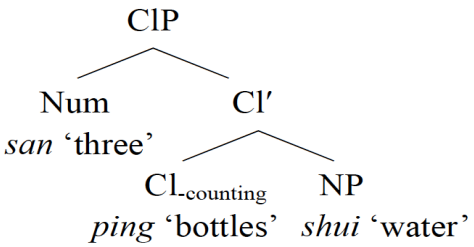
In this section, I show that a left-branching structure is neither plausible nor required, and therefore, non-unified accounts are not tenable. In turn, I will argue for a different and simplified right-branching structure that accounts for the syntax of measure words in question.

Following X. Li (2011), X. Li and Rothstein (2012) claim that a "measure" vs. "counting" difference corresponds to two different syntactic structures of measure words. They argue that the measure reading of measure words is expressed by a left-branching structure (i.e., (8a)), and the counting reading is expressed by a right-branching structure (i.e., (8b)).

(8) a. Measure reading



b. Counting reading



X. Li and Rothstein (2012: 709-710) propose that one classifier may carry either a measure reading or a counting reading. When it expresses a measure reading, the classifier and the numeral form "a complex classifier" that "combines" with NP through a left-branching structure (see also Tang 1990). Therefore, the numeral within the complex classifier is obligatory (e.g., (9a)). However, when a classifier expresses a counting reading, it heads a right-branching structure taking NP as its complement and the numeral as an optional modifier, e.g., (9b).

(9) a. Measure reading

Ta-de	jiuliang	shi	*(yi)	ping	hong-jiu.
his	drinking-ability	be	one	CL.bottle	red-wine

'His drinking-ability is one bottle of red wine.'

b. Counting reading

Ta	zuo-shou	na	le	(yi)	ping	hong-jiu.
he	left-hand	take	PERF	one	CL	red-wine

'He is crrying a bottle of red wine in his left hand.'

Nonetheless, there are some problems in this analysis. First, X. Li and Rothstein (2012) does not specify how the complex classifier in (8a) "combines" with the NP. According to X. Li (2011), the complex classifier modifies the NP, but the structure (8a) shows that the whole constituent is a Classifier Phrase. Second, the claim that the numeral expression in structure (8a) is part of a complex classifier is not empirically supported. Note that a numeral expression in the so-called "measure" reading can be as large as a phrase that normally does not undergo lexical head incorporation (e.g., *chaoguo yi* 'more than one' in (10)).

(10)

Ta-de	jiuliang	juedui	shi	chaoguo	yi	ping	hong-jiu.
his	drinking-ability	definitely	be	more.than	one	CL.bottle	red-wine

'His drinking-ability is definitely more than one bottle of red wine.'

Third, Zhang (2013) points out that according to X. Li, the numeral-classifier sequence in (8a) modifies the noun, and thus, the modified NP cannot be deleted, unlike (8b) where the noun is the complement and can be deleted. However, Zhang (2013) shows that even under a measure reading, the so-called modified noun can still be deleted, as shown in (11) (see also (6)). Therefore, I render the analysis (8) not plausible.

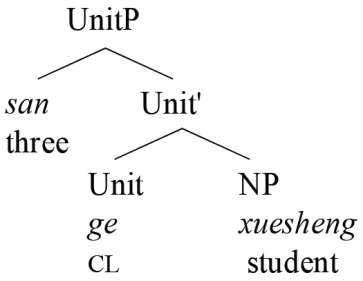
(11)

Baoyu	yao	mai	san	bang	yingtao,	Daiyu	yao	mai	wu	bang	~~yingtao~~.
Baoyu	want	buy	three	pound	cherry	Daiyu	want	buy	five	pound	

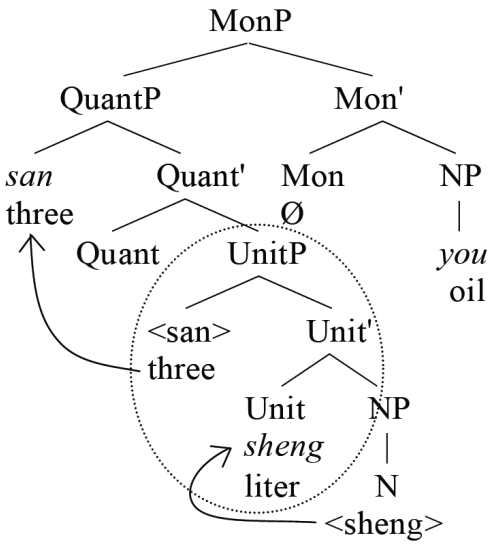
'Baoyu wants to buy three pounds of cherries, and Daiyu wants to buy five pounds.'

Taking a different non-unified analysis, Zhang (2013) proposes that measure words expressing "individual, or individuating" readings head a Unit Phrase (i.e., UnitP in (12a)), whereas standard measurements and words expressing "collective, container, or partitive" readings require a left-branching structure, i.e., her Monotocity Phrase (MonP) in (12b).

(12) a. Individual, individuating reading



b. Collective, container, partitive readings and standard measurement



The motivation behind this non-unified account is essentially based on the fact that sometimes the modifiers of measure words can contradict modifiers of the noun.

(13) **yuanyuan**-de yi guan **fang** tang
round-DE one CL.jar square sugar
'a round jar of sugar cubes'

As shown in the example (13), the modifier of the measure word (*yuanyuan-de* 'round') contradicts the modifier of the noun (*fang* 'square'). Zhang argues that a left-branching structure is required in order to block such modifiers from c-commanding the NP, so that the scope of the left-peripheral modifier excludes the NP.

However, unlike Zhang's proposals, I believe examples like (13) are exactly the supporting evidence for UnitP being an independent projection dominating NP. I argue that the occurrence of Unit head changes the semantic core of the whole nominal expression, and that the projection UnitP dominates the complement NP. In other words, examples like (13) show that the NP is indeed under the scope of the measure word *guan* 'jar'. That is, the sugar cubes in (13) have to be organized and referred as a unit of "a round jar", e.g., (14a) (vs. (14b)).

(14) a. a round jar of sugar cubes b. a square jar of sugar cubes

The examples in (15) demonstrate the same point. I argue that it is because UnitP dominates NP and expresses the semantic core of the whole nominal expression, the structure allows the modifiers of UnitP to be semantically contradict the modifiers of NP.[4] This idea is not novel, just as TP is relevant to and is extended from *v*P/VP, and TP structurally c-commands *v*P/VP, but sentential adverbs only target TP; same as the relation between a transitive verb and its object NP, where the semantic evaluation of the VP modifiers is semantically independent of the complement NP.

(15) a. [$_{\text{UnitP}}$ **tebie** **hou**-de san pian [$_{\text{NP}}$ **bo** shaobing]]
unusually think-DE three CL.piece think bread
'three unusually thick pieces of thin bread'

[4] In this paper, I do not consider examples like (i). It is known that examples with adjectives immediately precede classifier are rare, and usually only size adjectives, *da* 'big' and *xiao* 'small', can occur in such a position. I assume that such expressions are real complex classifiers that are formed morphologically before entering syntax.

(i) liang da-pian xiao binggan
two big-CL.piece small cookie
'two big-pieces small cookies'

Note that the adjective in the complex classifier does not perform like an adjective phrase. That is, it cannot be realized with the *de*-marker (e.g., (iia)), and it cannot be modified by adverbs like *hen* 'very' (e.g., (iib)).

(ii) a.*liang da-**de**-pian xiao binggan
two big-de-CL.piece small cookie

b.*liang **hen**-da-pain xiao binggan
two very-big-CL.piece small cookie

b. [$_{UnitP}$ **hen** **da**-de san ke [$_{NP}$ **xiao** pingguo]]
very big-DE three CL small apple
'three very-big-sized small apples'

As shown in the translation of examples in (15), the initial adjectives directly modify the Unit, rather than the NP. It is true that sometimes there is a correlation between the substance/individual and the unit/group of the substance/individual. When it is the case, we may find the modification of Unit extends to its following NP. I suppose that such semantic effects can also be explained through the current proposed structure (7) through c-command. In other words, I argue that the UnitP alone can also account for the same range of facts without complicating the syntax of measure words. Given the current proposal, one may predict that adjectives that only modify NP cannot modify UnitP. The prediction is supported by the contrast shown in (16).

(16) a. [$_{UnitP}$ san jian [$_{NP}$ **shiqian-de** guwu]]
three CL prehistoric-DE antiquity
'three pieces of prehistoric antiquities'

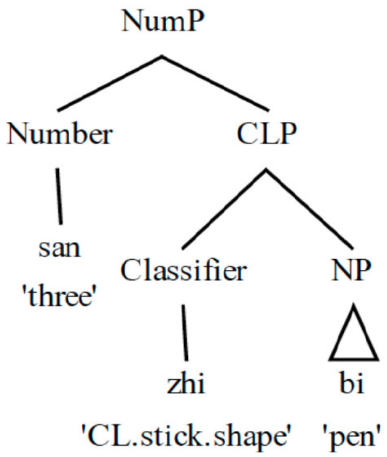
b.?* [$_{UnitP}$ **shiqian-de** san jian [$_{NP}$ guwu]]
prehistoric-DE three CL antiquity

In sum, I argue that left-branching structures do not straightforwardly account for the phenomenon at issue, and facts discussed in this section in turn also cast doubts on non-unified accounts. In the next section, I compare the widely adopted right-branching analysis with my simplified right-branching proposal. I will show that the proposed UnitP is syntactically and phonologically motivated, and that the current proposal naturally accounts for other related phenomena.

3 A Simplified Right-branching Analysis: the Unit Phrase

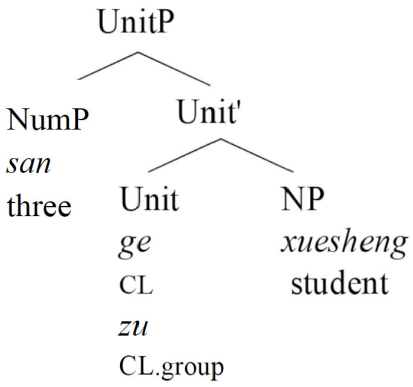
In the literature, proposals that adopt a unified right-branching structure usually analyze Number Phrase (NumP) as an independent projection dominating Classifier Phrase (CLP), and the two projections in turn dominate NP (see Tang 1990, Cheng and Sybesma 1999, Li 1999, Borer 2005, and Huang, Li and Li 2009).

(17) The widely adopted right-branching structure



However, the structure (17) faces some empirical problems. In the following sub-sections, I show why (17) should not be adopted and how syntactic arguments as well as phonological arguments support the current proposal (7) (repeated below).

(7) Proposal: Unit Phrase



3.1 Number Phrase Parasitic on Unit

In this section, I show the structure (17) faces some empirical problems. First, a noun may occur alone or with a Unit, but a noun cannot be accompanied by a numeral alone.

(18) a. Wo jian-guo [$_{N}$ **gou**].
I see-EXP dog
'I have seen dogs/a dog.'

b. Wo jian-guo [$_{Unit}$ **zhi**] [$_{N}$ **gou**].
I see-EXP CL dog
'I have seen a dog.'

c. *Wo jian-guo [$_{Number}$ **san**] [$_{N}$ **gou**].
I see-EXP three dog
'I have seen three dogs.'

The contrast between (18a-b) and (18c) is not expected under the structure (17), if we assume that number, Unit, and noun are heads of individual projections, it is not clear why only the numeral behaves differently. Note that demonstratives can also co-occur with noun alone, like Unit.

(19) Wo jian-guo [$_{Demonstrative}$ **na**] [$_{N}$ **gou**].
I see-EXP that dog
'I have seen that dog.'

Second, a numeral must always co-occur with a Unit within a nominal expression. The examples in (20) and (21) show that the grammaticality with or without Unit is consistant in both indefinite and definite expressions. Unit must occur in the nominal expression when there is a numeral.

(20) a. *Wo jian-guo ***san*** gou.
I see-EXP three dog
'I have seen three dogs.'

b. Wo jian-guo ***san*** **zhi** gou.
I see-EXP three CL dog
'I have seen three dogs.'

(21) a. *Wo jian-guo na ***san*** gou.
I see-EXP that three dog
'I have seen those three dogs.'

b. Wo jian-guo na ***san*** **zhi** gou.
I see-EXP that three CL dog
'I have seen those three dogs.'

In other words, numeral expressions are parasitic on the realization of Unit. If one postulates that Number Phrase dominates Unit (classifier) and noun, it is difficult to explain why the occurrence of the numeral always relies on the occurrence of classifier, a constraint not observed in other heads within nominals. Instead, the current analysis argues that Unit and N are head elements whereas number phrase is the specifier of UnitP. It structurally suggests that head elements can each co-occur with a noun, but number phrases is less independent, since it is the specifier of UnitP, unlike other heads.

3.2 The Distribution of Modifiers against NumberP > UnitP

The distribution of relative clauses and adjectives also argues against (17) but supports the UnitP structure (7). Given the DP hypothesis proposed for Mandarin (see Li 1998, Hsieh 2005, Tang 1990, 2005, Huang et al. 2009), I show that a relative clause can occur before a DP (e.g., (22a)), between a demonstrative and a UnitP (e.g., (22b)), or between a classifier and an NP (e.g., (22c)). However, a relative clause never occur between a number phrase and a classifier, as shown in (23).

(22) a. [$_{DP}$ [$_{RC}$ **meiren yao de]** *na* shi ben shu]
nobody want DE *that* ten CL book
'those ten volumes of books, which nobody wants'

b. [$_{DP}$ *na* [$_{UNITP}$ [$_{RC}$ **meiren yao de]** *shi ben* shu]]
that nobody want DE ten CL book
'those ten volumes of books that nobody wants'

c. [$_{DP}$ na [$_{UNITP}$ shi *ben* [$_{NP}$ [$_{RC}$ **meiren yao de]** *shu*]]]
that ten CL nobody want DE book
'those ten volumes of books that nobody wants'

(23) *[$_{DP}$ na [$_{UNITP}$ *shi* [$_{RC}$ **meiren yao de]** *ben* [$_{NP}$ shu]]]
that ten nobody want DE CL book
'those ten volumes of books that nobody wants'

Assuming that a modifier may uniformly be introduced to the left-periphery of a phrase in Mandarin (see Huang 1982), and based on the structure (17), one may wonder why a relative clause is banned at the left-periphery of CLP (e.g., (23)). However, the contrast between (22) and (23) can be accounted for naturally under the proposed structure (7). I argue that each such phrase functions as the interpretive scope of the modifier (see (22)), and that since a numeral is the specifier of UnitP, modifiers cannot intervene between the numeral and Unit' (see (23)). The distribution of adjectives demonstrates the same point.

(24) a. [$_{DP}$ [**hen gui de**] **na** shi ben shu]
very pricy DE that ten CL book
'those ten volumes of books, which are pricy'

b. [**na** [$_{UnitP}$ [**hen gui de**] **shi** ben shu]]
that very pricy DE ten CL book
'those ten pricy volumes of books'

c. [na [shi **ben** [$_{NP}$ [**hen gui** **de**] **shu**]]]
that ten CL very pricy DE book
'those ten volumes of books that are pricy'

d.* [na [$_{\underline{NumbP}}$ **shi** [**hen** **gui** **de**] **ben** shu]]
that ten very pricy DE CL book
'those ten volumes of books that are pricy'

The examples in this section show that modifiers of nominal expressions show consistent distribution within a complex nominal, and that the proposed structure (7) naturally explains the distribution of adjectives and relative clauses, whereas the generally adopted structure (17) would wrongly generate expressions like (23) and (24d), or leave such facts unaccounted for.

3.3 The Third Tone Sandhi against NumberP > UnitP

The phenomenon of the third tone sandhi also supports the proposed structure (7). In Mandarin, the third tone [214] must undergo tone sandhi and become the second tone [35] when the syllable carrying [214] is followed by another syllable carrying [214]. An example of such sandhi rule application is shown in (25).

(25) Mandarin Third tone sandhi:

	lao.shu 'mouse'
a. Underlying tone:	**214**.214
b. Surface tone:	**35**.214

In addition to words and compounds, the third tone sandhi rule also applies within phrases and sentences. The generalization reported in the phonology literature is that when the structure is left-branching, only one sandhi pattern is observed, but when the structure is right-branching, more than one pattern is available (see Duanmu 2005 and the references therein). While there is no consensus on the domain of application in phonology literature, interesting, if we pay closer attention to the syntactic structure of the data reported, we find that among the right-branching examples, the sandhi rule applies optionally between a head and its complement, however, if a phrase serves as a specifier/modifier of a head, the sandhi rule applies obligatorily. For instance, generally speaking, adverbs are analyzed as specifier/modifier of the head adverb or the head verb in an Adverb Phrase or a Verb Phrase, respectively. The examples in (26) show that adverbs and their head always form a prosodic unit, and the third tone sandhi rule always applies.

(26) a. [$_{VP}$ [$_{AdvP}$ [$_{AdvP}$ hen] hao] yang] 'very easy to raise'

	very	good	raise
Underlying tone:	214	214	214
Surface tone:	**35**	**35**	214

b. [$_{VP}$ [$_{AdvP}$ gan.jin] mai] 'buy hurriedly'

	hurriedly	buy
Underlying tone:	214.214	214
Surface tone:	**35.35**	214

Similarly, assuming that adjectives are specifier/modifier of the head noun, we can find examples like (27) show that the same tone sandhi phenomenon is observed between adjectives and nouns, i.e., the third tone sandhi rule is applied obligatorily.

(27) a. [$_{NP}$ [$_{AdjP}$ hao] jiu] 'good wine'

	good	wine
Underlying tone:	214	214
Surface tone:	**35**	214

b. [$_{NP}$ [$_{AdjP}$ jue mei] jing.guan] 'splendid view'

	exceptionally	beautiful	landscape
Underlying tone:	35	214	214.55
Surface tone:	35	**35**	214.55

The third tone sandhi phenomenon provides another interesting argument supporting the proposed structure (7), but against (17). (28) shows that the third tone sandhi rule always applies between the numeral (*wu bai* 'five hundred') and the Unit (*dang*), although it can be optionally applied between the classifier (*dang*) and the noun (*ying.pain* 'movie') (cf. (28b) vs. (28c)).

(28)

	wu.bai	*dang*	*ying.pian* 'five hundred movies'
	five.hundred	CL	movie
a. Underlying tone:	214.214	214	214.51
b. Surface tone:	**35.35**	**35**	214.51
Syntax structure: [$_{UNITP}$			]
c. Surface tone:	**35.35**	214	214.51
Syntax structure: [$_{UNITP}$			[$_{NP}$]]

Following the generalization reported in the phonology literature, the two acceptable tonal patterns (28b) and (28c) show that the phenomenon at issue involves "right-branching structure", and thus, more than one tonal pattern is available. Next we need to consider why the third tone sandhi rule only optionally applies between Unit and NP. According to Cinque's (1993) Null Theory of Phrase Stress, when a complement is present, the complement is the stress bearer, rather than the head and the specifier, and specifiers/modifiers are always weak. Given the Mandarin data presented so far, I hypothesize that Cinque's proposal on phrasal stress assignment may be applied to the phenomenon of third tone sandhi within the phrasal domain in

Mandarin. That is, the third tone sandhi rule obligatorily applies between the numeral and the classifier (e.g., (28b) and (28c)) since the numeral is the specifier of UnitP. The sandhi rule, however, has an option between the Unit and the NP: the sandhi rule can apply because two third tones are adjacent (e.g., (28b)), but it does not have to apply (e.g., (28c)) because NP is syntactically the complement of Unit.

Following the same reasoning, if one analyze a number phrase taking a classifier phrase as its complement (as in (17)), this analysis would wrongly predict that the sandhi rule can be optionally apply between the numeral and the Unit, contrary to the facts (e.g., (28) above vs. (29) below).

(29)		*wu.bai*	*dang*	*ying.pian* 'five hundred movies'
		five.hundred	CL	movie
a.	Underlying tone:	214.214	214	214.51
b.	*predicted tone:	**35.** 214	214	214.51
c.	Syntax structure:	[$_{NUMP}$	[$_{CLP}$	[$_{NP}$]]]

The preceding examples show that the commonly adopted structure (17) faces empirical challenge syntactically and phonologially, but the current proposal (7) can correctly predict the distribution of modifiers, the third tone sandhi application, and the interpretation of modifiers within nominal expressions through a unified right-branching account. In Section 4, I show that this proposal further gain supports from phenomena of nominal coordination and nominal internal ellipsis.

4 The Structural Prediction of UnitP

4.1 Nominal Coordination

The proposed structure (7) echoes an observation on nominal coordination in Mandarin reported by Aoun and Li (2003). Aoun and Li point out that coordinators in Mandarin exhibit categorical restriction. Coordinator that are relevant to nominal expressions are summarized in (30).

(30) a. ***jian*** 'and': coordinates two NPs
b. ***he*** 'and': coordinates two DP

The example in (31) shows that when two phrases lower than the UnitP (their classifier) are coordinated, *jian* 'and' is used, but not *he* 'and'.

(31) Wo xiang zhao yi ***ge*** [$_{NP}$ [$_{RC}$ fuze yingwen de] [$_{NP}$ mishu]]
I want find one CL charge English DE secretary

jian/*he [$_{NP}$ [$_{RC}$ jiao xiaohai de] [$_{NP}$ jiajiao]].
and teach kid DE tutor

'I want to find a person who can be a secretary that takes care of English (matters) and can be kids' tutor.'

Nonetheless, when two conjuncts both have demonstratives, only *he* 'and' is allowed, e.g., (32).

(32) Wo xihuan [$_{DemP}$ [$_{RC}$ fuze yingwen de] [$_{DP}$ ***na*** yi ge mishu]]
I like charge English DE that one CL secretary

jian/he** [$_{DP}$ [$_{RC}$ jiao xiaohai de] [$_{DP}$ ***na yi ge jiajiao]].
and teach kid DE that one CL tutor

'I like the secretary who takes care of English (matters) and the tutor that teaches kids.'

Based on the proposed structure (7), one may predict that UnitPs can be coordinated. The example in (33) shows that the relative clauses signal the maximal UnitP are coordinated, and that UnitPs are coordinated by *he* 'and'.

(33) Wo xihuan ***na*** [$_{UnitP}$ [$_{RC}$ fuze yingwen de] [$_{UnitP}$ san wei mishu]]
I like that charge English DE three CL secretary

***jian/he** [$_{UnitP}$ [$_{RC}$ jiao xiaohai de] [$_{UnitP}$ liang wei jiajiao]].
and teach kid DE two CL tutor

'I like those three secretaries who take care of English (matters) and those two tutors that teach kids.'

Note that no matter which coordinator is used, trying to coordinate two numeral phrases is not allowed in Mandarin.

(34)* Wo xihuan na [$_{NumP}$ [$_{RC}$ fuze yingwen de] [$_{NumP}$ san]
I like that charge English DE three

jian/he [$_{umP}$ [$_{RC}$ jiao xiaohaide] [$_{NumP}$ liang wei mishu]].
and teach kid DE two CL secretary

'I like those three secretaries who take care of English (matters) and those two tutors that teach kids.'

4.2 Nominal Internal Ellipsis

Following Lobeck that ellipsis is licensed by a functional head and following Merchant (2001) that structural identity is respected in ellipsis, I show that sentences with ellipsis support the proposed structure, i.e., the ellipsis site can be NP or UnitP.

Example (35) shows that the elided part can be recovered from its antecedent NP, *shangyi* 'shirt'. Note that the presence of Unit *jian* (the classifier of clothes) to the left of the ellipsis site suggests that what is elided in this sentence indeed is an NP.

(35) **NP**

Wo	zhi	kandau								
I	only	see								
[$_{DP}$ [$_{RC}$	Xiaomei	zuotian	mai	de]	na	san	***jian***	[$_{NP}$	**shangyi]**,	
	Xiaomei	yesterday	buy	DE	that	three	CL		shirt	
dan	wo	mei kandau								
but	I	not see								
[$_{DP}$[$_{RC}$	ta	jintian	gang	mai de]	na	san	***jian***	[$_{NP}$	~~**shangyi**~~]].	
	she	today	just	buy DE	that	three	CL		shirt.	

'I only see those three shirts that Xiaomei bought yesterday, but I don't see those three [shirts] that she just bought today.'

A similar effect is found with respect to UnitP. (36) shows that ellipsis targets the UnitP, *san jian shangyi* 'three shirts,' which is embedded inside of a DP.

(36) **UnitP**

Ni	keyi	mai									
you	can	buy									
[$_{DP}$	na	[$_{UnitP}$ [$_{RC}$	you	biaoqian		de] [$_{UnitP}$	**san**	**jian**	**shangyi]]],**		
	that		have	tag		DE	three	CL	shirt		
dan	bie	buy									
but	not	buy									
[$_{DP}$	na	[$_{UnitP}$ [$_{RC}$		mei	you	biaoqin	de] [$_{UnitP}$	~~**san**~~	~~**jian**~~	~~**shangyi**~~]]].	
	that			not	have	tag	DE	three	CL	shirt.	

'You could buy those three shirts with tags, but should not buy those [three shirts] without tags.'

However, unlike the current analysis, an analysis adopting (17) would not be able to directly explain the following ungrammatical example in which the classifier phrase that is analyzed as the complement of number is elided.

(37) **NumberP**

* Wo	zhi	kandau	[$_{DP}$	zhe	[$_{NumP}$	san	[$_{ClP}$	***jian***	[$_{NP}$	**shangyi]]]],**		
I	only	see		this		three		CL		shirt		
dan		wo	mei	kandau	[$_{DP}$	na	[$_{NumP}$	san	**~~[$_{ClP}$~~**	**~~jian [$_{NP}$~~**	**~~shangyi~~]]]].**	
but		I	not	see		that		three		CL	shirt.	

'I only saw these three shirts, but I don't see those three [shirts].'

The preceding discussion shows that UnitP is syntactically dominating NP but NumP is better analyzed as the specifier of UnitP. In the following sections, I will show how the proposed structure helps us explain the facts related to the interpretations of nominal expressions.

5 Syntax-Semantics Correlations

The proposal suggests that a nominal expression in Mandarin may be realized as a phrase of distinct size (e.g., DP, UnitP, NP). I have shown that a nominal expression in Mandarin may appear as Noun alone or as Noun accompanied by one or both of Demonstrative and Unit. However, Number appears only contingently on the introduction of Unit, as expected under the proposed analysis in (7). I argue that measure words should be analyzed as UnitP that changes the semantic core of the whole nominal expression. That is, the realization of UnitP syntactically expresses quantity and or measurement of a defined unit of nouns.

To begin, given the proposed structure, one may infer that when the UnitP is projected as the highest projection of a nominal, such an expression only denotes quantity of a unit, and that such an expression would not be referential. The conjecture is borne out. Example (38) shows that the quantity-denoting adverb *yigong* 'altogether' is not compatible with a referential DemP, but only with UnitP.[5]

(38) a.

Ta	***yigong***	mai-le	[$_{UnitP}$	wu	ben	shu].	
he	**altogether**	buy-PERF		five	CL	book	

'His purchasing of books totaled 5 volumes.'

b.

#Ta	***yigong***	mai-le	[$_{DP}$	zhe	wu	ben	shu	].
he	**altogether**	buy-PERF		this	five	CL	book	

'He bought altogether these five books.'

[5] The sentence in (38b) may become acceptable when the speaker is pointing at five books that are physically present. The pragmatic effect involved is outside of the scope of the current study, so I leave the explanation for future study.

Moreover, it is known that a nominal expression containing only number-Unit-Noun is not referential, unlike a nominal expression containing a demonstrative. Under the proposed structure, it suggests that UnitP cannot co-refer with or bind a pronoun but a DP can. The contrast in example (39) shows that a UnitP is not referential, whereas a DP is.

(39) a. *[$_{\text{UnitP}}$ **San ge ren$_i$**] tai-bu-qi liang jia ni gei **tamen$_i$**-de gangqin.
three CL man lift-not-up two CL you give them -DE piano
'Three people cannot lift two (of the) pianos that you gave to them.'
(from Huang et al. 2009:290, modified with the proposed structure)

b. [$_{\text{DP}}$ **Na san ge ren$_i$**] tai-bu-qi liang jia ni gei **tamen$_i$**-de gangqin.
that three CL man lift-not-up two CL you give them -DE piano
'Those three people cannot lift two (of the) pianos that you gave to them.'

In sum, I argue that measure words at issue should be analyzed as the head of UnitP, and that the realization of UnitP changes the semantic core of the whole nominal, and its complement NP is perceived and interpreted under the scope of UnitP. Based on the proposed structure, we also have a way to structurally distinguish nominal expressions that only denote quantity or measurement from DP and NP.

6 Concluding Remarks

In this paper, I argued that UnitP should be identified as a distinct projection dominating NP in Mandarin. This paper showed that the proposed structure accounts for the distribution of nominal modifiers, the restriction of the occurrence of numeral, Unit, and Noun within a nominal, and the third tone sandhi application. I showed that the realization of UnitP changes the semantic core of the whole nominal, and that NP is under the scope of UnitP. I had also shown that quantity denoting adverbs are only compatible with UnitP, and that UnitP is not referential, unlike DP. The proposed structure also directly and correctly predicts the realization of nominal coordination and nominal internal ellipsis, and provides a simpler way to explain the phenomenon at issue through a unified account.

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