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P-Insertion and Ellipsis

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Abstract

The Number + Classifier in Mandarin [Number + Classifier + *de* + NP] can have a property reading—describing the property of the NP, or a quantity reading—expressing the quantity of the entity. The two mainly differ in: (a) *de* required in the property construction but optional in the quantity construction, and (b) *de* licensing NP-deletion in property, not quantity constructions. These differences are due to their structures and the derivation of *de*'s. The [Number + Classifier] expressions in the property construction are just like other prenominal relative clauses modifying the NP [[Number + Classifier]$_{\text{relative clause}}$ + *de* + NP]. *De* is base-generated as a head that can license its complement (the modified NP) to be null. In the quantity reading, the structure should be [Number + [Classifier + NP]], where Classifier is a head taking the NP as its complement. *De* is phonologically inserted—a way to reflect focus-encoding on the quantity via the strategy of phonological phrasing. As focus can also be encoded by stress or pause, *de*-insertion does not always apply (=(a)). When the NP is missing, proper phonological phrasing is achieved without *de*. That is, the apparent failure of *de* licensing NP-deletion in the quantity construction is actually due to the non-application of *de*-insertion (=(b)). As *de* is not inserted phonologically when the NP is null, NP-deletion should apply before *de*-insertion. This ordering follows straightforwardly from the approaches that derive ellipsis structures via deletion-in-syntax or base-generation of empty categories. Support for these claims comes from the corresponding data in Taiwanese, whose tonal behavior reveals a clearer picture.

Keywords

Number-Classifier, property *de*, quantity *de*, NP-ellipsis, phonological insertion

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This work shows that even though a potential ellipsis licensor may be overtly present and seemingly available, it may come into existence too late to license ellipsis. Mandarin *de* is the potential ellipsis licensor in question. It will be argued that the *de's* in the constructions of the form [Number + Classifier + *de* + NP] should be distinguished according to how they are derived: one is base-generated and the other is inserted to meet phonological requirements. The former is the base-generated modification marker required to occur between an adjectival or clausal modifier and a modified NP. This marker is a head that can license NP ellipsis. In contrast, the latter *de* is derived via a phonologically–motivated insertion process—P-insertion (cf. Zubizarreta's 1998 P-movement). P-insertion does not take place without the relevant phonological motivation, as in the case of when the following NP is null (Zubizarreta's 1998 last resort; also see the economy consideration in Nunes 2009). Evidence for such a P-insertion analysis is mainly from the corresponding patterns in Taiwanese containing *e*. The patterns in Taiwanese have identical characteristics as those in Mandarin. What is revealing is the fact that Taiwanese has clear tonal variations reflecting structures, which helps us to unambiguously define the properties of *e* and allows us to account for the behavior of the corresponding Mandarin *de*.

The proposed analysis of *de/e* can be straightforwardly extended to other cases where *de/e* does not license the following phrase to be empty. Examples are the patterns containing quantity expressions modifying verbs and pseudo-possessives.

An implication of this P-insertion analysis for the approaches to ellipsis concerns ordering: a deleted NP must already be null when P-insertion applies. Otherwise, the properties of the structures containing the inserted *de/e* cannot be captured. This ordering follows straightforwardly from the properties of P-insertion and ellipsis structures analyzed as the result of deletion in syntax or base-generation of empty categories (see, among many others, the collection of papers in Schwabe and Winkler 2003, Johnson 2008, also Merchant 2001, Li 2007, Aoun and Li 2008, Baltin 2012, among many others). P-insertion is a phonologically motivated operation, like the phonologically motivated movement (P-movement) in Zubizarreta (1998). P-movement, according to Zubizarreta, should apply at the end of the syntactic derivation—the Λ-structure, before branching into PF and Assertion Structure. P-insertion and P-movement are two of the same P-operation processes; the timing of P-insertion would be the same as for P-movement. If ellipsis takes place before P-insertion, it naturally follows that *e* would not be wrongly inserted

This paper is structured as follows. Section 1 describes the major Mandarin constructions in consideration. Section 2 reviews the available analyses. A new proposal built on the Taiwanese structures is made in section 3. Section 4 extends the analysis to other constructions involving verbal classifiers and pseudo-possessives and discusses its implications for the approaches to ellipsis.

1. Number-Classifier Constructions

Let us begin with the category of "Classifier" in the constructions having the form [Number + Classifier (+ *de*) + NP].[1] It has often been observed that the category of "classifier" in Chinese should be distinguished into two groups, which can be labeled as count-classifiers vs. massifiers, or as classifiers (narrower usage of the term "classifier") vs. measure words.[2] However, it will be shown that the syntactically significant distinction should be between Number + Classifier[3] used to describe the property of an NP (referred to as the property interpretation), or to receive focus for their quantity reading. Structurally, one has the modification structure like those with clausal modifiers to NPs [[Number + Classifier] + *de* + NP], where *de* is obligatory, and the other has the Classifier as a head taking the following NP as its complement [Number [Classifier + (*de* +) NP]]. In the latter, different information foci affect the use of *de* (for relevant discussions, see Tang 1990, 1993, 2005, Au Yeung 2005, Her and Hsieh 2008, Jiang 2008, Her 2012, Y. Li 2009, Jiang 2008, 2012, X. Li 2011, Tsai 2011, Zhang 2011, 2012, Jin 2012, Li and Rothstein 2012, Liu 2013, among others). These points are elaborated below.

It is well known that nouns in Chinese cannot be counted directly. A counting unit is required, as in (1a-b) below (Cl for classifiers not having precise English translations):

(1) a. san-ben shu
three-Cl book
'three books'
b. san-xiang shu
three-box book
'three boxes of books'

A counting unit such as a count-classifier *ben* in (1a) is said to "name the unit in which the entity denoted by the noun naturally occurs" and the other type, massifier or measure word like *xiang* in (1b), is to "*create* a unit of measure" (Cheng and Sybesma 1999: 515). Although semantically, the two types of counting units differ in naming or creating units, syntactically, they have the same behavior. They both allow modification by simple adjectives before them and the marker *de* after them, in contrast to claims in some earlier works regarding these two

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1 I will use "Classifier" to represent all the counting words after a number, including count-classifiers and massifiers/measure words. If only the count-classifier subset is referred to, then the term "count-classifier" will be used.

2 Numerous works have discussed the similarities and differences between the two types, such as Chao (1968), Li and Thompson (1981), Tai and Wang (1990), Croft (1994), Peyraube (1998), Cheng and Sybesma (1998, 1999), Tang (1990, 1993, 2005), among many others.

3 The label "Number + Classifier" does not imply any specific structure. It can be that Number and Classifier form a phrase as in the modification structure [[Number + Classifier] + *de* + NP] or that Classifier is a head taking the NP following it as its complement [Number + [Classifier + NP]].

types of classifiers—only massifiers allow co-occurring adjectives and *de*.[4] That adjectives and *de* indeed can also occur with count-classifiers is supported by the many examples available through more Internet search, in addition to earlier observations and corpus search, such as Tang (2005), Hsieh (2008), Her and Hsieh (2010) (also see note 4). For instance, the following examples are from searches at *baidu.com* and *yahoo.com.tw* during January 8-10, 2013.[5] The examples in (2) below contain count-classifiers modified by adjectives, including the most commonly used generic count-classifier *ge*.[6] (The Number + Adjective + Classifier expression is underlined.)

(2) a. 目前我国新闻学专业的学科框架包括哪三大个部分？
Muqian wo guo xinwenxue zhuanye de xuekekuangjia baokuo
present we country journalism major DE curriculum include
na san-da-ge bufen?
which three-big-Cl part
'Which three big components are included in the curriculum in the journalism major in our country now?'
(http://zhidao.baidu.com/question/340591141.html)

b. 三大个错误睡姿
san-da-ge cuowu shui-zi
three-big- Cl wrong sleep-posture
'three big wrong sleep postures'
(http://blog.sina.com.cn/s/blog_ae08ff1601014wpa.html)

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[4] For instance, as mentioned in Her (2012), Chao (1968:555), Paris (1981:32), Zhu (1982:51), Tai and Wang (1990), Tai (1994), Cheng and Sybesma (1998:388, 1999:515) distinguish classifiers from measure words (massifiers) in regard to the use of *de* before classifiers. However, the distinction is not made in many works such as Tang (1990, 1993, 2005), Hsieh (2008), X. Li (2011), Li and Rothstein (2012), Her (2012), Her and Hsieh (2010), Zhang (2011), etc. Adjectives are impossible before count classifiers in Cheng and Sybesma (1998, 1999) but possible in Chao (1968), Tang (1990, 2005), Her (2012), Her and Hsieh (2010), Zhang (2011), etc.

[5] Mostly, *baidu.com* represents data from mainland China and *yahoo.com.tw* from Taiwan. For the readers who know Chinese characters, I copied the original characters, which appeared in the simplex form (China) and the traditional complex form (Taiwan). Nonetheless, regional differences exist in the frequency (not absolute presence vs. absence) of using *de* after a classifier as discussed in Feng and Li (2013).

[6] The adjective before a classifier modifies the classifier, a counting unit. The adjective modifying a counting unit is normally about the size of a unit "big" or "small". For units that denote length, the adjectives "long" and "short" may be used. That is, only adjectives compatible with classifiers semantically are possible. Some other classifiers cannot be modified by adjectives inherently, such as standard measurement units, "pound", "ounce", "gram", "inch" etc. In contrast, the adjectives modifying nouns occur immediately before them and they can be anything describing properties of objects, which are an open class.

c. 一顿吃了三大只鲜贝肉
yi-dun chi-le san-da-zhi xian bei rou
one-meal eat-LE three-big-Cl fresh shell meat
'eat three big units of fresh shell fish in one meal'
(http://beckyblog.com/)

d. 可以同时蒸三大只猪
Keyi tongshi zheng san-da-zhi zhu.
can simultaneously steam three-big-Cl pig
'(It) can steam three big pigs simultaneously.'
(http://bbs.city.tianya.cn/new/TianyaCity/content.asp?idItem=5090&idArticle=822)

e. 附赠一大本中文歌詞翻譯
fuzeng yi-da-ben zhongwen geci fanyi
with.free.gift one-big-Cl Chinese lyrics translation
'comes with a free gift of a big volume of Chinese lyrics translation'
(http://www.pcstore.com.tw/eyesfun/M03736035.htm)

The following examples illustrate the co-occurrence of *de* with count classifiers, with or without an adjective (relevant expressions underlined).

(3) a. 怎样吃半颗的百优解
Zenyang chi ban-ke de Baiyoujie?
how eat half-Cl DE Baiyoujie
'How to eat half a pill of Baiyoujie?'
[*Baiyoujie* here should be a medication in pill form]
(http://zhidao.baidu.com/question/26916818.html)

b. 再來的就是一大個的牛心
Zai lai de jiu shi yi-da-ge de niu xin.
next come DE then be one-big-Cl DE cow heart
'The one that came next was a big cow heart.'
(http://gourmetkc.blogspot.jp/2011/09/blog-post_27.html)

c. 司法考试三大本的新书每年什么时候出？
Sifa kaoshi san-da-ben de xin shu mei nian shenme shihou chu?
judicial exam three-big-Cl DE new book every year what time out
'When are the three big volumes of new judicial exam books published every year?'
(http://zhidao.baidu.com/question/311309695.html)

d. 上百隻的野生獼猴
shang-bai-zhi de yesheng mihou
up-hundred-Cl DE wild macaque
'around a hundred wild macaques'
(http://blog.yam.com/cindy0919/article/45695810)

e. 上百位的聖誕老公公齊聚奇美[7]
Shang-bai-wei de shengdan lao-gonggong qiju Qimei.
up-hundred-Cl DE Christmas old-men gather Qimei
'Around a hundred Santa Clauses gathered at Qimei.'
(http://tw.myblog.yahoo.com/cm_evangel/article?mid=1291)

f. 平均每40人才能占有一台的电视机
Pingjun mei sishi ren cai neng zhanyou yi-tai de dianshi ji.
average every 40 people only can possess one-Cl DE TV set
'By average, only every forty people can possess a TV set.'
(http://baike.baidu.com/view/4509271.htm)

g. 一口气能吃四十个的包子
yi-kouqi neng chi sishi-ge de baozi
one-breath can eat 40-Cl DE bun
'able to eat 40 buns in one breadth'
(http://wap.tudou.com/wap/detail?vid=XMzg3NDE3Mzgw&cid=10068)

h. 我們20件的傢具，只賣了兩萬塊錢[8]
Women ershi-jian de jiaju, zhi mai-le liang-wan kuaiqian.
we 20-Cl DE furniture only sell-Asp 20K dollar
'Our 20 pieces of furniture only sold for 20 thousand dollars.'
(http://big5.chinanews.com:89/cj/2011/06-13/3107200.shtml)

Accordingly, count-classifiers and massifiers/measure words should not be distinguished syntactically. Both massifiers/measure words and count-classifiers can precede *de* and be modified by adjectives. Nonetheless, the occurrence of *de* (with or without a pre-classifier adjective) does make a difference in meaning. When *de* appears, the information focus may be on quantities expressed by Number + Classifier expressions. This can be demonstrated by the most typical context

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7 The fact that a number expression can be a subject in this example suggests that the number phrase denotes quantity, as in Li (1999), thanks to this very relevant point from Hoi-ki Law and Haoze Li. It should be pointed out that any noun phrase can have information focus on the Number + Classifier expression without being projected as NumP only (see the rest of the text on information focus). For instance, definite expressions like the following can have an optional *de*, and NP ellipsis without *de* – the quantity reading construction to be discussed in this work:

(i) Wo yi-tian jiu kan-wan le zhe/na san-da-ben/xiang (de xin shu).
I one-day then read-finish LE this/that three-big-Cl/box DE new book
'I finish reading those three big books/three big boxes of books in one day.'

8 Cheng (2012) separates a noun like *jiaju* 'furniture' from other massifiers, citing its impossibility of occurring with *de*. She notes that "the classifiers which are used for *furniture*-nouns can be modified by *small* and *big*, though they cannot be followed by *de*. In other words, classifiers associated with *furniture* nouns differ from typical *count*-classifiers, which cannot be modified by *big* or *small*. However, these classifiers are not compatible with quantity measure." (section 11.4.2). Nonetheless, examples like (3h) show that *de* is possible with *furniture* nouns, as long as the quantity reading is the intended information focus – the amount of money from the amount of furniture sold in this example. Many other examples illustrating the possibility of *furniture*-type classifiers with *de* can be found online, which will not be copied here because of the limited space.

where *de* occurs, such as examples like (4a-b) below, whose focus is on quantity.[9]

(4) a. Wo yi-kouqi chi-wan yi-da-ge de xigua, zhang-si-le.
I one-breath eat-finish one-big-Cl DE watermelon full-dead-PAR
'I finish eating a big watermelon in one breath; I am too full.'
b. Zhe-ge xiangzi keyi fang shi-da-ben de shu, shi-da-bao de tang.
this-Cl box can place ten-big-Cl DE book, ten-big-bag DE sugar
'This box can pack ten big books, ten big bags of sugar.'

In fact, the quantity reading for the construction with *de* has been noted, such as in Sybesma (1992) and Cheng (2012). They gave examples with a massifier unacceptable with *de* because the context is for an entity (individual) reading, rather than quantity (or "measure reading" in Cheng's term). For instance, it is not possible to order a glass of wine in a restaurant by using (5b) below. Instead, (5a) must be used (Cheng 2012: (25a,b)).

(5) a. yi-bei jiu
one-cup wine
b. yi-bei de jiu
one-cup DE wine

The following example appeared in Sybesma (1992:107, ex. (100a,b)), quoted in Cheng (2012), her (11a-b).

(6) a. #Ta yong xiao-wan he-le san bei jiu
he with small-bowl drink-LE three Cl-cup liquor
'He drank three glasses of liquor from a small bowl'
b. Ta yong xiao-wan he-le san bei(zi)-de jiu
he with small-bowl drink-LE three Cl-cup-DE liquor
'He drank three glassfuls of liquor from a small bowl.'

According to these authors, the sentence in (6a) is gibberish, indicated by #, but (6b) is not. In (6a), when *bei* 'cup' is used without *de*, the default interpretation is that the wine is consumed from the cup: the actual cup/glass is part of the scene. In contrast, when *bei* 'cup' is used with *de*, as in (6b), the wine need not be consumed from the cup/glass; in this case, *bei* 'cup'' merely provides a measure for the amount of liquor that was consumed.

The same distinction applies to count classifiers just like massifiers/measure words. For instance, (7a) with *de* is better than (7b) without *de* after the classifer.

(7) Zhe-dao cai xuyao de liang shi wu-da-ge de yangcong,
this-Cl dish need DE quantity be five-big-C DE onion

[9] To show the lack of distinction between count classifiers and massifiers/measure words, both types of examples are given whenever possible (but not to the extent of listing too many examples).

a. Ni jiu yong wan cheng dayue wu-da-ge de yangcong gei wo ba.
you then use bowl fill about five-big-Cl DE onion for me SFP
b. #Ni jiu yong wan cheng dayue wu-ge da yangcong gei wo ba.
you then use bowl fill about five-Cl big onion for me SFP
'The quantity this dish needs is five big onions; please fill a bowl with (the amount of) five big onions for me.'

The same distinction holds between the pair of sentences below.

(8) a. Wo yong beizi yizhi na, yigong dagai nale liang-da-ge de xigua.
I use cup continue take together about took two-big-Cl DE watermelon
'I kept taking (watermelon) with cups, altogether took about (the amount of) two big watermelons.'
b. #Wo yong beizi yizhi na, yigong dagai nale liang-ge da xigua.
I use cup continue take together about took two-Cl big watermelon
'I kept taking (watermelon) with cups, altogether took about two big watermelons.'

Let us refer to the noun phrase in (4), (5b), (6b), (7a) and (8a) as having a quantity reading and the noun phrase in (5a), (6a), (7b) and (8b), an entity reading. Essentially, the distinction in interpretation between the two is that, for the former, the information focus is on the quantity Number + Classifier expression and the information focus for the latter is on the entire noun phrase [Number + Classifier + NP] or simply the NP. To distinguish the two readings in the translation of the examples in this work, the quantity reading will have the Number + Classifer expressions in boldface to indicate that the information focus is on the quantity.

In addition, a third construction needs to be recognized:

(9) Zhe shi yi-ge san-bang de xigua.
this be one-Cl three-pound DE watermelon
'This is a three-pound watermelon.'

The Number + Classifier expression in this construction is a modifying expression describing the property of the noun, just like an adjectival phrase or a clause modifying an NP—the type of watermelon in question is a three-pound type. Such a modifier, just like any other modifiers, can occur before or after the counting words for the NP, *yi-ge* in the example above and below:

(10) San-bang de na yi-ge xigua.
three-pound DE that one-Cl watermelon
'that three-pound watermelon.'

Let us call this reading the property reading. Therefore, we may distinguish the following three constructions involving number and classifier expressions (Tang 1990, 1993, 2005, Sybesma 1992, Au Yeung 2005, Jiang 2008, Y. Li 2009,

X. Li 2011, Tsai 2011, Cheng 2012, Jin 2012, among others):[10]

(11) a. san-xiang(da) xigua
three-box big watermelon
'three boxes of (big) watermelons'

a'. san-ge (da) xigua -entity
three-Cl big watermelon
'three (big) watermelons'

b. san-(da-)xiang (de) xigua
three-big-box DE watermelon
'**three big boxes** of watermelons'

b'. san-(da)-ge (de) xigua -quantity[11]
three-big-Cl DE watermelon
'**three big** watermelons'

c. san-(da-)xiang de xigua
three-big-box DE watermelon
'watermelons (packed) in three big boxes'

c'. san-(da)-ge de xigua -property[12]
three-big-Cl DE watermelon
'watermelons (packed) in three big counts'

The examples in (11a,b,c) contain massifiers/measure words and those in (11a',b',c'), count classifiers. As noted earlier, the identical behavior between the two sets shows that there are no clear formal tests such as the co-occurrence of an adjective or *de* distinguishing the two types of classifiers. Let us put aside the distinction and refer to all the instances of the counting units in (11) simply as classifiers.[13]

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[10] For some speakers, the distinction between entity reading and quantity reading is not easily made. This is not surprising because when an entity is being talked about, the quantity of the entity can be accompanying information. When quantity is involved, the quantity can be expressed solely by the quantity expression alone or the amount of entities. It is only in clearer contexts like those in (7a-b) and (8a-b) can the distinction be understood more clearly. X. Li (2011) notes that the default reading for those with measure words is the quantity reading; and those with classifiers, individual (entity) reading.

[11] An adjective may also occur right before the noun in the quantity and property reading constructions. For instance, it is possible to say (i) below:

(i) Wo chi-le san-da-ge de xiao xigua.
I eat-LE three-big-Cl DE small watermelon
'I ate **three big units** of the small kind of watermelons.'

Xiao xigua 'small watermelons' refers to the kind of watermelons being small ones; 'big-Cl' expresses that the units are big in size for the kind in question.

[12] The property reading is clearest when it is used to identify an object among choices. For instance, watermelons can be packed in boxes or in barrels. I can say: *wo yao de shi san-xiang de xigua, bushi san-tong de (xigua)* 'what I want is watermelons packed in three boxes, not watermelons packed in three barrels'. Watermelons can also be packaged in different counts - *wo yao de shi san-ge de xigua, bushi liang-ge de (xigua)* 'what I want is watermelons packaged in three counts, not watermelons in two counts'.

[13] Jin (2012) proposes that another distinct construction illustrated in (i)-(ii) should be recognized:

(i) qi-bang de zhongliang
seven-pound DE weight
'the weight of seven pounds'

(ii) liang-mi de kuandu
two-meter DE width
'the width of two meters'

The rationale is that the NP following *de* in this construction cannot be deleted (like the quantity reading; see the text shortly), in contrast to the similar property reading structure, which allows

Consider the minimally distinct patterns (11b/b') and (11c/c'). They differ in the obligatoriness vs. optionality of de. De is obligatory in (11c/c') but is optional in (11b/b'). The obligatoriness of de in (11c/c') is like other modifying phrases requiring de before the modified nouns (or NPs):

(12) a. ta xihuan *(de) shu
he like DE book
'books that he likes'
b. taolun zhengzhi *(de) shu
discuss politics DE book
'books that discuss politics'
c. hen youyong *(de) shu
very useful DE book
'books that are useful'

What is relevant to this work is the syntactic difference between (11b/b') and (11c/c') in their acceptability of a null NP following the classifier or *de* – only the property reading construction (11c/c') allows the NP to be empty. Thus, the following examples only have the property interpretation.

(13) Property readings
a. Xigua, ta yao san-ge/bang de, wo yao wu-ge/bang de.
watermelon he want three-Cl/pound DE I want five-Cl/pound DE
'Watermelons, he wants three-count/pound ones, I want five-count/pound ones'
b. Wo, xigua yao san-ge/bang de.
I watermelon want three-Cl/pound DE
'I, watermelons, want three-count/pound ones.'
c. Xigua, ba san-ge /bang de mai-wan de ren bu duo.
watermelon BA three-Cl/pound DE sell-finish DE people not many
'Watermelons, the people that sold off three-count/pound ones were not many.'

Under the quantity reading, the NP in [Number + Classifier (+ de) + NP] can be null only if *de* does not appear:

NP ellipsis, although both require *de*. It differs from the property reading construction in its impossibility with demonstratives, being questioned etc. Nonetheless, it is not necessary to distinguish this *de* from the *de* in modification structures (cf. Li 2012); i.e., a third construction is not needed. See Li (2007), Aoun and Li (2003: chapter 5-6). Aoun and Li use the term relative constructions to include all instances in Chinese that have a clause before an NP (*de* occurring between them). The cases in (i)-(ii) can be subsumed under the property reading construction and the contrasts between the two are due to more general differences in the property of the modified NP.

(14) Quantity reading
Xigua, ta yao san-ge/bang, wo yao wu-ge/bang.
watermelon he want three-Cl/pound I want five-Cl/pound
'Watermelons, he wants **three/three pounds**, I want **five/five pounds**.'

The acceptability of (14) is the same as that for any classifier in Chinese allowing its following NP to be null. (15a-d) summarize the facts presented so far.

(15) In a noun phrase [Number + Classifier (+ *de*) + NP] in Mandarin Chinese
a. The Number + Classifier can express a focus on quantity or describe the property of the NP – quantity reading vs. property reading.
b. Under the quantity reading, *de* is optional. Under the property reading, *de* is obligatory.
c. The NP can be null under the quantity reading only if *de* is absent.
d. The NP can be null under the property reading. *De* is required.

These facts raise very interesting questions: why are there such contrasts? what is the status of *de* in the quantity reading construction? For the property reading structure, it is expected that *de* is obligatory. The Number + Classifier phrase is a modifying phrase, just like an adjectival phrase or a clausal modifier to a noun phrase. *De* is a modification marker - [[Number + Classifier]$_{\text{modifier}}$ + *de* + NP].[14] However, the quantity reading construction does not have a straightforward analysis. Logically speaking, two options are available to analyze Number + Classifier: either as a modification structure or as a hierarchical head structure taking the NP following Classifier as a complement. The modification option raises the questions of how it is different from the property reading construction structurally such that the two differ in the acceptability of an empty NP and the obligatoriness vs. optionality of *de*. For the head-complement option, the question is what *de* is, where it should be situated, and why the NP cannot be null when *de* is present, just like the *de*-less [Number + Classifier + NP] where Classifier is the head of a Classifier Phrase.[15] To answer these questions, let us first consider some more important facts and available analyses.

2. Constituency and derivation

The structural properties we need to consider are the constituency of phrases

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[14] See Li (2008) for the numerous logical possibilities that have been proposed for analyzing this *de*. The modifying Number + Classifier can be taken as a relative clause, because Number + Classifier expressions can function as predicates.

[15] Other options have been proposed, such as *de* being a complementizer, a linker, a determiner or heading a focus head, heading its own functional projection *de*P or attached to the preceding classifier (e.g., Simpson 2002, den Dikken 2006, Sio 2006, Tang 2006, Shi 2008, Li 2008, Jiang 2008, Tsai 2011, Jin 2012, Paul 2012, among many others). The main point would be how to derive without stipulations the lack of NP deletion and the tonal properties of the corresponding morpheme in Taiwanese, as discussed in section 2.

containing *de* and the conditions for an NP following a classifier/*de* to be empty.

There have been analyses addressing the relevant issues, such as Tang (1990, 1993, 2005), Jiang (2008), Li (2009), Tsai (2011), Jin (2012). Very briefly, Jiang and Jin restrict their quantity-reading construction with *de* to only noun phrases with measure words. A linker analysis, along the line of den Dikken (2006), is adopted in Jiang. However, such an analysis would need to be stipulated as restricted to quantity-denoting constructions, different from what was originally intended for in den Dikken's work, which consistently treats all instances of *de* within noun phrases as a linker. Jin proposes that *de* heads a focus projection for the quantity reading construction, encoding the fact that focus is on quantities (and our work shares this insight regarding information focus on quantity expressions), although the (im)possibilities of null NPs would need to be stipulated (also see note 15). Tang's analysis refers to insertion, which will be explored from the phonological perspective in this analysis. Tsai provides a formal structural licensing account for NP-ellipsis. Below, I briefly present the major points in Li (2009), which extends the nominal quantity-reading structure to the verbal quantifier construction, and Tsai's (2011) structural licensing account, as these discussions will clarify the structural characteristics of quantity-reading constructions.

Li (2009) equates the impossibility of a null NP in the quantity reading with *de* to the impossibility of constructions like the following one:

(16) Ta kan-le liang tian de shu, wo kan-le yi-tian (*de).
he read-Asp two day DE book I read-Asp one-day DE
'He read two day's books, I read one day(*'s)"

In (16), 'two days' modifies the activity of book reading even though it appears as forming a constituent with the object as demonstrated by the occurrence of *de*, a marker inside a nominal phrase. Let us refer to 'two days' in this construction as a verbal quantifier. A nominal quantity structure discussed above has very similar properties as a verbal quantity phrase:

(17) Ta kan-le yi-bai-ye de shu, wo kan-le wu-shi-ye (*de).[16]
he read-Asp one-hundred-page DE book I read-Asp five-ten-page DE
'He read **100 pages**' books [100 pages of books], I read **fifty pages**."

The Number + Classifier parts in these examples ('# day/page') express the quantity of the activity of book reading – duration of time or number of pages. That is, just like (16) where the duration of time is not a modification of books, the number of pages is not a modification of books in (17). Adopting Huang's (2008) analysis, both can be analyzed as having the structure as below.

(18) $[_{VP}\ V_i\ [$*one hundred pages /two days* $[_{GP}\ [_{VP}\ t_i$ *book*$]]]]$

16 'De' can occur if the relevant interpretation is a 50-page book.

In this structure, the modifying [Number + Classifier] is adjoined to the following gerundive phrase that contains an empty gerundive head, the trace of the verb and the object. *De* is inserted between the modifier and the GP.

Regarding the fact that the structure in (18) cannot license a null NP, Li suggests that this is due to the base-generation of an empty category, which cannot have the complex structure as the GP in (18). However, the analysis did not directly address the issue of how the *de*'s in quantity and property readings are differentiated.

Tsai's (2011) account aims to distinguish the two *de*'s and answer the related question of why a null NP is possible in one construction but not the other. His analysis is briefly described below.

First of all, he argues that the null NP in [Number + Classifier (+*de*) + NP] not only can be derived by ellipsis but also by extraction. For instance, (13a) can be the result of ellipsis and (13b), object preposing. Regardless of the derivation, the generalizations in (15) follow if there is a formal licensing condition on empty categories – a condition in the spirit of the head government requirement in the Government and Binding theory (Chomsky 1981).[17] He proposes that *de* in the property pattern (modifier in his term) is a head but *de* in the quantity reading case (measure phrase in his term) is a clitic attached to and forming a unit with the preceding constituent. The formal licensing condition would therefore allow an empty NP following *de* in the property construction but not the quantity reading structure.

In short, the important points of Tsai's proposal are

(19) a. The null NP following *de* can be the result of ellipsis or movement.
b. Such null NPs are subject to a formal licensing condition (licensed by a sister head);
c. *De* is a clitic attached to and forming a unit with the preceding element in the quantity pattern but is a head taking the following NP as a complement in the property construction;
d. The head *de*, not the clitic *de*, licenses a null NP; therefore,
e. the NP following *de* in the property construction is acceptable, but not in the quantity structure.

Nonetheless, it will be shown below that constituency tests suggest that *de* can be attached to the following element even in the quantity reading construction.[18]

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[17] Tsai suggests that the lexical government requirement can be made to follow from Chomsky's (2007, 2008) No Tampering Condition (NTC).

(i) *No Tampering Condition:*
Merge of X and Y leaves the two syntactic objects unchanged.

[18] The P-insertion analysis of the quantity reading construction only cares if an NP is phonologically null; it does not make any claims on whether an NP is base-generated as null or undergoes deletion in Syntax (see section 4). Nonetheless, it is worth pointing out that null NPs following *de* should

To show that the marker *de* can form a constituent with the following NP,

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not be analyzed as the result of movement. This is because (i) island conditions can be violated in such cases and (ii) extractions from within noun phrases generally are not possible in Chinese. That island conditions are not relevant is clear according to the acceptability of (13c), where the relativization is originated from a complex NP in the subject position. Other island conditions can be shown to be violable:

Adjunct condition:

(i) Xigua, ta [ruguo neng maidao san-bang de] yiding hui hen gaoxing.
watermelon he if can buy three-pound DE certainly will very happy
'Watermelons, he will be happy if he can buy three-pound ones.'

Subject condition

(ii) Xigua, [ta tiantian chi san-bang de] bu keneng.
watermelon he every.day eat three-pound DE not possible
'Watermelons, it is not possible that he eats three pound ones every day.'

These examples demonstrate that base-generation of a null NP must be possible. In addition, it can be shown that movement is not possible from within a noun phrase. For instance, the possessor in the following example cannot be interpreted as coindexed with the topic phrase. The identification rule of an empty pronoun in this position would not allow it to be coindexed with a noun phrase that is not closest to it (Huang 1982).

(iii) *Zhangsan$_i$, wo xihuan [e_i baba].
Zhangsan I like father
'Zhangsan, I like (his) father.'

The unacceptability of (iii) shows that the movement option is also not available. One may argue that (iii) is ruled out by the left branch condition, rather than the prohibition against extraction from within noun phrases. However, there are cases of relative clauses not allowing the modified NP on the right to be empty pronouns (even when coindexed with a topic). Movement is not available because the relevant expressions are not acceptable.

(iv) a. Wo zhidao [[ta weishenme bu lai de] liyou]
I know he why not come DE reason
'I know the reason why he cannot come.'
b.*Liyou$_i$, wo zhidao [[ta weishenme bu lai de] e_i]
reason I know he why not come DE

(v) a. Wo zhidao [[ta zenme wangcheng gongzuo de] fangfa]
I know he how complete work DE way
'I know the way he completed work.'
b. *Fangfa$_i$, wo zhidao [[ta zenme wanchang gongzuo de] e_i]
way I know he how complete work DE

The unacceptable (ivb) and (vb) are to be contrasted with the acceptable (vib) below.

(vi) a. Wo renshi [[yijing wangcheng gongzuo de] xuesheng]
I know already complete work DE student
'I know the students who have already completed work.'
b. Xuesheng$_i$, wo renshi [[yijing wanchang gongzuo de] e_i]
student I know already complete work DE
'Students, I know (the ones) who have already completed work.'

These constructions involve relativization in the (a) cases and topicalization of the NP modified by the relative clause in the (b) cases. Aoun and Li (2003, chapter 5 and 6) argue that the contrast between the unacceptable (ivb) and (vb), and the acceptable (vib) can be derived from differences between adjunct relativization (relativizing an adjunct) as in the former and argument

rather than the preceding Number + Classifier, evidence can be better found in Taiwanese. This is because (i) Mandarin and Taiwanese are alike in distinguishing the three types of constructions listed in (11a-c) and they have identical properties in (15a-d), and (ii) Taiwanese presents clearer clues to constituency structure because of the availability of tonal variations reflecting constituency structures, in contrast to *de* in Mandarin, which always has the neutral tone. The value of a neutral tone depends on that of the preceding tone. Therefore, even though the pronunciation of relevant expressions may sound as if *de* is related to the preceding element, it is not suggestive of any grammatical structure. The *de*'s in the two constructions in (11b-c) have identical pronunciations; but the one in (11c) is unambiguously a head capable of licensing its complement NP to be empty, which cannot be so in (11b). Fortunately, the tonal properties of the Taiwanese counterpart *e* can clearly decide on the constituency structure of [Number + Classifier + *e* + NP] (see Li 2012), as elaborated below.

Tonal variations in Taiwanese reflect constituency structures. It will be shown that the tone values of *e* in the quantity and property constructions support the following tonal grouping (curly brackets indicate phonological grouping), which means that the marker *e* must be able to form a constituent with the following NP. In addition, the *e* in the property reading can have two instances (e_0-e_7, (or the variant e_0-e_5 when NP is not overt)); but there is only one *e* in the quantity reading.

(20) a. Quantity
{Number + Classifier} + { e_7 NP}
b. Property
{Number + Classifier + e_0} + { e_7 NP}

To show that the representations in (20a-b) are correct, let us begin with the tonal properties of Taiwanese. Just as in Mandarin, every syllable in Taiwanese must have a lexically specified tone. What distinguishes Taiwanese from Mandarin is that the tone for the same morpheme is affected by its position—whether it is at the end of an NP or a VP (or more generally, predicate of a clause). When it is not

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relativization (relativizing an argument) as in the latter. Adjunct relativization requires a relative operator (which can have an overt "resumptive" copy in the relativized position, Ning 1993), but argument relativization does not. The NP following the marker *de* in these complex NPs cannot be empty because these empty categories are truly empty and cannot license a relative operator. Note that the empty category in these cases cannot be the result of a movement process; otherwise, it would be a variable, which is a copy of the topicalized phrase (movement as Copy and Merge in the Minimalist Program, Chomsky 1995) and which should be able to license a relative operator, just like their overt counterpart in (a). Accordingly, the unacceptability of (ivb) and (vb) shows that extraction of the NP following *de* is not possible.

The question that should follow from the generalization of non-extraction from within NPs described above is why such an extraction is not possible. An answer to this question can begin from Bach and Horn's (1976) generalization that extraction from within NPs is generally prohibited and the many debates in subsequent works on this issue (such as Erteschik-Shir 1981, Davis and Dubinsky 2003, among others), which will be left for future work.

in the final position of such a phrase, the tone is referred to as the combination tone. When it is in the final position, it is referred to as the isolation tone.[19]

The combination tone and isolation tone correspondence follows the so-called tone sandhi rules—a topic that has long been of interest to many linguists.[20] Relevant to our discussion, noun phrases of the form [XP *e* YP] have the following manifestations (for details and examples, see Li 2012).

(21) a. When an NP has a clausal or adjectival modifier XP with the marker *e* in between, [XP *e* NP], *e* should be analyzed as the combination of e_0+$e_{5/7}$
The tonal groups are [$_{DP/NP}$ [XP e_0] [$e_{5/7}$ NP]]. They are pronounced as
i. [$_{DP/NP}$ XP e_7 NP] when NP is overt; e_7 is the combination tone corresponding to e_5, the isolation tone ([$_{DP/NP}$ XP e_0-e_7 NP] possible, though sounding redundant)
ii. [$_{DP/NP}$ XP e_0 Ø] when NP is null (e_0-e_5 also possible, e_5 is the isolation tone)

b. When an NP has a possessor XP with *e* in between, [XP *e* NP], *e* should simply be analyzed as $e_{5/7}$.
The tonal groups are [$_{DP/NP}$ [XP] [$e_{5/7}$ NP]]. They are pronounced as
i. [$_{DP/NP}$ XP e_7 NP] when NP is overt; e_7 is the combination tone
ii. [$_{DP/NP}$ XP e_5 Ø] when NP is null; e_5 is the isolation tone

Now, consider the property reading construction, illustrated below:

(22) a. Gua beh go-liap e (kam-a).
I want five-Cl E orange
'I want (oranges) that are packed in five.'

b. Gua beh tsit-pong e (kam-a).
I want one-pound E orange
'I want (oranges) that are of the type of one pound in weight.'

In these cases, the Number + Classifier *go-liap, tsit-pong* are modifiers describing the property of the following NP. Independently, these [Number +

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19 The use of these terms is theoretically neutral, as opposed to the use of terms such as the basic/citation vs. changed/derived/sandhi tone. Other theoretically neutral sets of terms have been proposed such as Meyers and Tsay (2008), who suggest to label the two alternate tone forms as "juncture tone" and "context tone". According to them, "The tone alternations are between tones as they appear in juncture position (i.e. the right edge of a phonological constituent called a tone group) and in context position (elsewhere)." (p. 50)
The use of theoretically neutral terms is due to the fact that even though some in the literature have proposed that tone sandhi rules change isolation tones to combination tones (see Chiu 1931 for a pioneering work), others have argued that the combination tone should be analyzed as the basic one and the isolation tone, the derived one (such as Hashimoto 1982, and others subsequently). Many thanks to Prof. Chinfa Lien for his help on these points.

20 To name just a few among many, Chiu (1931), T'ung-ho Tung (1957), Wang (1967), Cheng (1968), Hsieh (1970), C.-H. Tung (1973), Yip (1980), Chen (1987, 1996, 2000), Yang (1991), Tsay (1994), Lien (2008), Meyers and Tsay (2008).

Classifier] expressions as a unit can function as predicates:

(23) a. Tsia-e kam-a go-liap.
these orange five-Cl
'These oranges are five counts.'
b. Tsia-e kam-a tsit-pong.
these orange one-pound
'These oranges are a pound.'

(22) demonstrates what (21a) describes; i.e., the [Number + Classifier] expression is a relative clause modifying the following NP. It is possible to have two *e*'s, with the expected tone values:

(24) a. Gua beh go-liap-e_0 (e_7 kam-a).
I want five-Cl orange
'I want (oranges) that are packed in five.'
b. Gua beh tsit-pong-e_0 (e_7 kam-a).
I want one-pound orange
'I want (oranges) that are of the type of one pound in weight.'

Nor is it surprising that the modified NP can be null because, as mentioned, this is simply the regular [relative clause + *e* + NP] structure, where the NP is licensed by the head *e* to be null.

Let us now turn to the quantity reading construction, illustrated by the following examples (the syllable with an isolation tone underlined):

(25) a. tsit-tua-siunn e sikue
one-big-box E watermelon
'**one big box** of watermelons'
b. tsit-tua-kinn e pangkinn
one-big-Cl E room
'**one big** room'
c. tsit-tua-pun e tsheh
one-big-Cl E book
'**one big** book'

The behavior of tones shows that *e* should form a tone group with the following NP:

(26) a. {tsit-tua-siunn$_1$} {e_7 sikue}
one-big-box E watermelon
'**one big box** of watermelons'
b. {tsit-tua-kinn$_1$} {e_7 pangkinn}
one-big-Cl E room
'**one big** room'

c. {tsit-tua-pun$_1$} {e$_7$ tsheh}
one-big-Cl E book
'**one big** book'

In these examples, the last syllable of each of the groups in curly brackets (underlined) has the isolation tone and all the other syllables take the combination tone, including *e*. Such tonal behavior shows that *e* cannot form a constituent with the preceding element. Were *e* to form a unit with the preceding phrase (cliticized to the preceding phrase), it should appear as the neutral tone e_0. A neutral tone following a high level tone (55 pitch on a 1-5 scale system, 1 being the lowest pitch) as for $siunn_{55}$ and $kinn_{55}$ in the examples above should also have a high level value, as in sin_{55}-e_0 'new (one)', kim_{55}-e_0 'gold', all pitch 55. However, e$_7$ has the mid 22 pitch.

The fact that *e* forms a tonal group with the following NP, indication of a grammatical unit in this language, rules out the option of *e* forming a constituent with the preceding element only. It also shows that this *e* is different from the *e* in the property reading construction (the contrast between (24) and (26)). (20a-b) represent the two structures. However, the question is what this *e* in the quantity reading construction is. Note that the NP in the quantity reading can be empty only if *e* is not present, just like the Mandarin counterpart. In these cases, the classifier takes the isolation tone because the following NP is missing.

(27) a. Gua beh go-liap. –*liap* isolation tone
I want five-Cl
'I want **five**.'
b. Gua beh tsit-pong. –*pong* isolation tone
I want one-pound
'I want **one pound**.'

What is the *e* in the quantity reading construction? I show in the next section that the *e* is inserted to resolve a conflict between the requirement of focus encoding and the application of tone sandhi rules; it is the result of phonologically-motivated insertion (P-insertion).

3. P-insertion

Recall that for an NP with Number + Classifier, the information focus can be on the NP (entity reading) or the Number + Classifier (quantity reading), as noted in (11a-b), repeated below:

(11) a. san-xiang (da) xigua
three-box big watermelon
'three boxes of (big) watermelons'
a'. san-ge (da) xigua -entity
three-Cl big watermelon
'three (big) watermelons'
b. san-(da-)xiang (de) xigua
three-big-box DE watermelon
'**three (big) boxes** of watermelons'
b'. san-(da)-ge (de) xigua -quantity
three-big-Cl DE watermelon
'**three (big)** watermelons'

Information focus generally is encoded in some way. As discussed in Feng and Li (2013), Mandarin and Taiwanese have different focus encoding strategies they utilize. Details aside, suffice it to point out that in Mandarin, it is possible to use stress to encode focus—stress on the NP or the Number + (Adjective+) Classifier in the relevant constructions (stress-focus correspondence, Selkirk 1984, Reinhart 1995).[21] It is also possible to use the strategy of phonological phrasing—making the focused part an independent unit in contrast to the normal pattern of being part of another phonological phrase[22] (see Pierrehumbert & Bekman 1988, Kanerva 1990, Downing et al. 2004, Koch 2008, among others, for phonological phrasing marking focus). To achieve proper phonological phrasing, a pause can be utilized—having or not having a pause between Number + Classifier and the following NP. A pause creates two phonological phrases {{Number + Classifier} + {NP}} and no pause means only one phonological phrase {Number + Classifier + NP}. The former is the quantity reading pattern and the latter, the entity reading construction. In addition, the phonological phrasing effect can be achieved without a pause but with insertion of a morpheme. This is more obvious in Taiwanese, as shown below. For convenience of presentation, I will sometimes use the terms "the pause strategy" and "the insertion strategy", even though both of these strategies are to achieve the same purpose of proper phonological phrasing.

Taiwanese generally does not use stress to encode focus (see Shyu 2010 on Taiwanese Mandarin). How about the strategy of phonological phrasing, creating separate units to reflect focus{{Number + Classifier} + {NP}}?[23] Unfortunately, for a [Number + Classifier + NP] expression in Taiwanese, a pause generally is not possible between the Classifier and the NP. The Classifier must always form a tone group with the NP and take the combination tone. A combination tone generally cannot be followed by a pause. Structurally, the Classifier functions like a head taking the NP following it as its complement. Other logical analytic options are not available. Were Number + Classifier an XP in the Specifier position, the Classifier would appear in the isolation tone according to tone sandhi rules (the Specifier of an NP, generally nominal, is a tone group itself). Nor can such Number + Classifier be a modifier; otherwise, the distinction between quantity and property reading constructions would be lost. The head status of the Classifier with the following NP as its complement, as indicated by the tonal properties, naturally accounts for why the NP following the Classifier can be missing—a null NP is licensed by

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[21] The stress strategy is most clearly used by true Beijing Mandarin speakers but is not used much by speakers of many other varieties of Mandarin. See Feng and Li (2013).

[22] The term "phonological phrase" in this work is a convenient label referring to the unit formed as a result of the strategy of phonological phrasing reflecting focus. It is not used in contrast to other prosodic units such as Intonational Phrase, Intermediate Intonational Phrase, etc. (see, for instance, Pierrehumbert 1980, Beckman and Pierrehumbert 1986). The exact status of such a unit for the purpose of focus-marking phonological phrasing is irrelevant.

[23] An adjective can optionally occur before the Classifier but does not affect phonological phrasing. The adjective before the Classifier is part of the tonal group containing the Classifier.

the Classifier head. In other words, syntactically and phonologically, [Number + Classifier + NP] must be one constituent, one tonal group, where Classifier is a head able to license the NP following it to be empty.[24] Nonetheless, the quantity reading construction can place focus on the Number + Classifier expression. When it does, the Number + Classifier expression should be a phonological unit excluding the NP following it. Thus, a conflict arises: according to the syntactic structure, the Classifier is a head taking the NP following it as its complement and must take the combination tone; however, it must use the isolation tone in order to reflect the grouping of {Number + Classifier} as a phonological unit excluding the NP following it—focus encoding via the strategy of phonological phrasing. To resolve the conflict, the linker within noun phrases *e* is inserted. The presence of *e* allows Number + Classifier to be a phonological phrase separate from the following NP: {Number + Classifier} + *e* + {NP}. Just like all the instances with an overt NP in a noun phrase, the inserted *e* forms a tonal group with the NP and undergoes tone change: {Number + Classifier} + {*e* + NP}.

The proposal of inserting *e* to resolve the conflict between the requirement of tonal grouping rules and the encoding of focus via phonological phrasing is reminiscent of the P(rosodically motivated)-movement in Zubizarreta 1998, which is to resolve the conflict between the Nuclear Stress Rule and Focus Prominence Rule in the grammar. P-movement of a phrase creates a different word order that allows both rules to apply successfully. In addition, Zubizaretta notes that P-movement should be subject to the condition of Last Resort, like other movement operations. That is, it does not apply if it is not needed. Similarly, P-insertion of *e* should not apply when an empty NP, being empty, cannot be a unit by itself or be part of one for the purpose of phonological phrasing. In other words, the [Number+ Classifier] expression is already a tonal group by itself when it is followed by a null NP. (Also see Nunes' (2009) economy condition that enforces faithfulness between the lexical items present in the numeration and the lexical items present in the PF output.) The insertion of *e* and Zubizarreta's P-movement are two of the same process P-operation (P-insertion and P-movement). This means that the apparent failure of *e* in the quantity reading construction licensing a null NP should actually be the non-application of *e*-insertion due to the lack of need to insert one.

The P-insertion analysis of *e* in Taiwanese can also be extended to the Mandarin counterpart *de*, although the effect is only seen in a limited manner because of the availability of additional focus encoding strategies (stress and pause) and because of the absence of tone sandhi requirements reflecting tonal groupings. Nonetheless, Mandarin does have limited cases of tone changes, such as the first of two consecutive third-tones being changed to the second tone. The following

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[24] Number is generally combined with Classifier (if an adjective intervenes, it is also combined together). However, if a number is complex, it is possible to divide the number into separate tonal groups (see Ionin and Matushansky 2006 on the structure of complex cardinals).

expressions illustrate the same point as what was described above.

(28) a. {yi$_4$-tong$_2$ shui$_3$}
one-bucket water
'a bucket of water'
(-*tong$_3$* changed to *tong$_2$*, one phonological phrase one-bucket water)
b. {yi$_4$-tong$_3$} *(de$_0$) shui$_3$
one-bucket DE water
'a bucket of water'
(-*tong$_3$* unchanged, two phonological phrases after *de* insertion[25])

In cases like (28a), a pause is difficult between *yi-tong* and *shui* to create two phonological phrases: *{*yi-tong*} {*shui*} (see Feng 1995 for the varieties of prosodic rules).[26] To create two phonological phrases, *de* is inserted, just as in Taiwanese. However, there is not always a need to insert *de* in order to create two phonological phrases in [Number + Classifier + NP] in Mandarin. When the third toned NP has another syllable (bisyllabic NP, rather than mono-syllabic third toned NP here), a pause is natural before the bisyllabic NP (cf. the bisyllabic nature of Mandarin prosody as in Feng 1995). The presence of a pause means the separation of phonological phrases. Therefore, *de* appears to be optional in the following case:

(29) {yi-tong$_3$} (de) shui$_3$guo$_3$
one-bucket DE fruit
'a bucket of fruit'

Nonetheless, the phonological phrasing strategy via *de* insertion or pause need not apply to encode focus because stress is always available in Mandarin for the purpose. The apparent "optionality" of *de* is due to the use or non-use of the pause and stress strategy. In other words, the variation stated in (11b) is due to the application of different strategies to encode focus.[27]

The availability of more focus encoding strategies in Mandarin in contrast to the sole reliance on phonological phrasing in Taiwanese conditioned by the tone sandhi rules also means a difference in when *de/e* is inserted in relevant expressions, which is a topic explored in Feng and Li (2013).[28]

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[25] (b) can be read as {*yi-tong de*} {*shui*} or {*yi-tong*} {*de shui*}. Unlike *e* in Taiwanese, *de* in Mandarin is always a neutral tone and can always be attached to the preceding element phonologically. In addition, for some speakers, a pause can occur in Mandarin between classifier and the neutral-toned *de*, which forms a unit with the following NP, as in Taiwanese (see Xiong 2005, Zhang 2000).

[26] If there is a major syntactic break between two third tones, two phonological phrases can be created and the first third tone is not required to change to the second tone: *jiu$_3$*, *hao$_3$* 'wine is good', *lie$_4$ jiu$_3$*, *hao$_3$* 'Liquor is good'.

[27] The last resort nature for P operations should be evaluated according to the specific strategy applied.

[28] Mandarin *de* insertion is best when the number is modified or not precise such as '3 to 5' 'five or above', '10 and more', 'about 100' etc. For some speakers, larger numbers are also better; but this distinction does not hold with all speakers and the notion of what constitutes a large number vs. a

In short, Mandarin allows three strategies to encode focus for elements within a noun phrase: (i) stress, (ii) pause, and (iii) P-insertion of *de*. The insertion of *de* takes place when neither (i) nor (ii) is used. The constructions in (11a-c) and the facts in (15) in both Mandarin and the Taiwanese counterparts are accounted for, summarized below.

(30) For a noun phrase [Number + Classifier (+ *de/e*) + NP] in Mandarin Chinese and Taiwanese

a. Entity reading—the information focus is on the NP (default focus)
The grammatical structure is [Number + [Classifier + NP]], where Classifier is a head taking the NP following it as its complement. The NP complement can be null because it is properly licensed by the Classifier head.

b. Quantity reading—the information focus is on Number + Classifier
The grammatical structure is [Number + [Classifier + NP]], where Classifier is a head taking the NP following it as its complement. The NP complement can be null as it is properly licensed by the Classifier head. This construction differs from the one above only in where the information focus is. In Mandarin, focus can be encoded by a pause or stress and nothing further happens if Number + Classifier expressions are stressed or followed by a pause.
If the pause or stress strategy is not used, focus encoding can resort to the strategy of phonological phrasing via P-insertion: *de/e* is inserted to make Number + Classifier a separate phonological phrase from the following NP. In Taiwanese, the stress strategy is not available and, because a pause cannot appear between Classifier and NP (due to the tonal grouping and tone sandhi rules), proper phonological phrasing can only be achieved via the P-insertion of *e*.
De or *e* is not P-inserted when the NP is null because Number + Classifier expressions constitute a phonological phrase in this case. Thus, the apparent failure of *de/e* licensing a null NP in this construction is actually non-application of *de/e* insertion due to the lack of motivation for P-insertion. Last resort or economy on P-operations makes *de/e* insertion unavailable.

c. Property reading—the focus can be on Number + Classifier or the entire noun phrase. The grammatical structure is [[Number + Classifier] *de/e* + NP], where Number + Classifier function as a modifier (a relative clause) modifying the following NP. The NP complement can be null as it is properly licensed by the modification marker *de/e*, which is a head taking the NP following it as its complement.

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small number is not clear (cf. Tang 1990, 1993, 2005, Hsieh 2008, Her and Hsieh 2010, X. Li 2011, Li and Rothsten 2012, among others). Some Mandarin informants also noted that if they clearly focused on the quantity expression, *de* insertion would be better (many thanks to Haoze Li for this generalization according to his work with his informants).

4. Extensions and ellipsis

The proposal of *de* insertion is not new (see, for instance Huang 1982, 2008, Tang 1990, 1993 and most recently, Zhuang and Liu 2012). Huang (1982, 2008) made use of *de* insertion in some syntax-semantic mismatch constructions in Chinese. When we take such insertion to be P-insertion, the prediction should be that *de* does not license a null NP. Indeed, the prediction is born out. An example is the construction involving a postverbal duration phrase found in (16). Similarly, a frequency phrase denoting the frequency of an activity can form a unit with the direct object, with *de* between them. Importantly, this *de* does not license NP-ellipsis:

(31) Ta shi-le haoji-ci de pingguo zhongzi; wo ye shi-le haoji-ci
he try-Asp many-times DE apple seed I also try-Asp many-times
(*de)[29]
DE
'He tried apple seeds many times; I also tried many times.'

Constructions with verbal classifiers behave alike, such as the ones below.

(32) a. Ta ti-le yi-jiao de men, wo ye ti-le yi-jiao (*de).
he kick-Asp one-foot DE door I also kick-ASP one-foot DE
'He kicked a foot's door (gave the door a kick); I also kicked a foot (gave a kick).'

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[29] Some works noted that frequency *ci* 'times' cannot be followed by *de* (e.g, Soh 1998). However, a Google search using the keywords *haojici de* and *baicide de* on January 12, 2013 produced examples like the one in the text as well as the following ones:

(i) 每天都要上*好几次的*网
Mei-tian dou yao shang haoji-ci de wang.
every-day all will log-in many-times DE net
'Get on internet many times every day.'
(http://bbs.tianya.cn/post-feeling-2706776-1.shtml)

(ii) 去了*幾百次的*侯家鹹水鴨
Qu-le ji-bai-ci de Hou-jia xian-shui-ya
go-LE several.hundred.times DE Hou-family salt-water-duck
'Went to Hou's salt-water-duck hundreds of times.'
(http://blog.yam.com/shawnandpeggy/article/58805389)

(iii) 走了*上百次的*线路
Zou-le shang-bai-ci de xianlu.
walk-LE over-hundred-times DE route
'walked over a hundred routes'
(http://www.douban.com/event/15247210/discussion/42987909/)

(iv) 宝宝喝了*好几次的*高丽参汤
Baobao he-le haoji-ci de gaoli shen tang.
baby drink-LE many-times DE Korea ginseng soup
'Baby drank Korean ginseng soup many times.'
(http://ask.yaolan.com/question/1207111839381179e806.html)

There was even a Korean opera with the Chinese title *qian-ci de wen* 'a thousand times of kisses'

b. Ta gang da-le liang-chang de wangqiu, wo ye da-le
he just play-Asp two-Cl DE tennis I also play-LE
liang-chang (*de)
two-Cl DE
'He just played two games of tennis; I also played two games.'

Another construction involves "pseudo" possessives. In some cases, the object part of a [V+O] expressing an activity can be combined with the doer of the activity and form a pseudo possession relation with *de* inserted between the doer and the object. NP-ellipsis is not possible:

(33) a. Ta de ma qi de bi wo (*de) hao.
he DE horse ride DE compare I DE good
'He rides horses better than I do.'
b. Ta de dianying kande duo; wo (*de) kan de shao.
he DE movie watch much I DE watch DE little
'He watches movies frequently. I saw little.'

These sentences with *de* are acceptable if a true possession relation is intended. For instance, (33b) can be acceptable if it indicates his movies were seen more than my movies.

NP-ellipsis thus can in turn be a test for deciding whether a *de* is P-inserted or not. This will help us distinguish some very interesting sub-types of pseudo-possessives, which will be discussed in a separate work.

Finally, the P-insertion analysis has implications for ellipsis concerning its timing. A hot topic about how ellipsis constructions are derived grammatically is the timing issue of deletion. The options are (i) empty elements are base generated (ii) the operation of deletion applies in Syntax and (iii) deletion is non-spell-out of elements - PF deletion (see, among many others, the collection of papers in Schwabe and Winkler 2003 and a brief review of different approaches in the introductory chapter of the book, the chapters in Johnson 2008; also see the PF deletion approach in Merchant 2001, base-generation in Li 2007, and deletion in Syntax in Baltin 2012, among others). P-movement, according to Zubizarreta, should apply at the end of the syntactic derivation—the Λ-structure, before branching into PF and Assertion Structure. Taking P-insertion as the same as P-movement, both being P-operations, the timing of insertion should be the same as well. If ellipsis is deletion in Syntax or base-generation of empty categories, it naturally follows that *de/e* would not be wrongly inserted. On the other hand, if ellipsis is determined at PF (Spell-out), then, some ordering stipulation would be required.

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語音嵌入及省略

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提要

漢語名詞短語 [數 + 量 + 的 + 名] 中的 [數 + 量] 可以有修飾功用（表質義）或表達數量（表量義）：(a) 表質義結構的“的”是必要的，表量義結構的“的”可有可無。(b) 只有表質義結構的“的”可以允准名詞短語省略。這些區別可歸因於兩者結構不同以及“的”的衍生差異。表質義結構中的 [數 + 量] 基本上就像修飾名詞的關係子句—[[數 + 量]$_{\text{關係子句}}$ + 的 + 名]。如同一般的修飾結構，“的”是基礎生成，本身是中心語，允准其後的名詞短語省略。表量義結構則是 [數 +[量 + 名]]，其中量詞是中心語，以後面的名詞短語為補足語。“的”是語音嵌入的，分別出語音群組來標示數量為訊息焦點。由於焦點也可以由重音，停頓其他方式標示，因此語音嵌入“的”的手段可以不用—表量義的“的”可有可無 (=(a))。另外，如果量詞後的名詞短語不出現，數－量本身就是一個語音群組，“的”就沒有理由嵌入來標示焦點，亦即名詞短語省略時，表量義的“的”不嵌入 (=(b))。這表示語音嵌入必須晚於名詞短語省略。這是省略結構是由句法省略衍生或基礎生成空語類的自然結果。這些論點可以比較清楚地從台灣閩南語的聲調變化以及聲調群組反映句法結構的現象得到支持。

關鍵詞

數量詞，質義“的”，量義“的”，名詞短語省略，語音嵌入