

Linguistic Form and Function: Expression of Countability in Chinese *wh*-Phrases

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Abstract

The present paper investigates the relationship between form (morpho-syntax) and function (semantic interpretation) as involved in the expression of countability in the Chinese *wh*-pronoun system. We focus on three *wh*-pronouns: *duo-shao* ‘much-little’, *duo-shao-ge* ‘much-little-Classifier’, and *ji-ge* ‘how many-Classifier’. Based on the examination of the interpretation and distribution of these *wh*-phrases in three distinct linguistic contexts (questions, bare conditionals, and negative statements), we generalize that while *duo-shao* functions as an indeterminate determiner, *duo-shao-ge* and *ji-ge* function as two count determiners. This generalization invites the conclusion that the morpho-syntax of these *wh*-phrases, particularly, the presence/absence of a classifier, determines and shapes their semantic interpretation in countability. From a more general perspective, the present study suggests that a linguistic form determines its own linguistic functions.

Keywords: Chinese *wh*-pronouns, countability, morph-syntax, classifiers

1. Introduction

Form and function are two fundamental elements addressed in the linguistic field. The relationship between linguistic form and function is particularly significant for the study of linguistic phenomena that are involved in the interplay between language, the real world, and human cognition. The grammatical count-mass distinction is one of these linguistic phenomena. As there is a general tendency to conceptualize and encode countable discrete objects as count terms, and uncountable fluids or substances as mass terms, the same slice of reality could be classified as either count or mass, e.g., *shoes* vs. *footwear*. The intricacy of the relationship between linguistic form and function as involved in the

count-mass issue has generated heated discussion in the fields of linguistics, philosophy, and psycholinguistics (see Quine, 1960; MaCawley, 1975; Pelletier, 1979, 2012; Ware, 1979; Allan, 1980; Macnamara, 1982; Gordon, 1982; Gathercole, 1986; Bloom, 1990; Chierchia, 1998, 2010; Borer, 2005; Barner & Snedeker, 2005; Bale & Barner, 2009; Rothstein, 2010; among many others).

In the literature, the discussion of the count-mass issue sees linguistic form and function correspond respectively to morpho-syntax and semantic interpretation in countability. In recent years, scholars have come to the consensus that the morpho-syntax of a determiner shapes the countability of its associated nouns (Borer, 2005; Bale & Barner, 2009; Rothstein, 2010). To illustrate, in English *a lot*, *many*, and *much* represent three morpho-syntactically distinct determiners; *many* is a count determiner, *much* is a mass determiner, and *a lot* is an indeterminate determiner. The distinct count-mass status of each of these three determiners triggers distinct count and mass uses of their associated nouns. The count determiner *many* triggers a count use of the noun *apple*—the expression *many apples* refers to a large number of individual apples. By contrast, a mass use of *apple* will be triggered when it co-occurs with the mass determiner *much*—the phrase *much apple* refers to a large amount of apple substance. The indeterminate determiner *a lot* is underspecified with the countability of its associated noun and allows a count use (e.g., *a lot of apples*) and a mass use (e.g., *a lot of apple*). Thus it can be seen that in languages which have grammatical count-mass distinction, like English, the grammatical status of a determiner determines countability of its associated noun. The same noun may have distinct count or mass uses, depending on the grammatical status of the determiners that it is attached to.

Mandarin Chinese is argued to lack the systematic grammatical means to encode count-mass distinction (see Hansen, 1983; Graham, 1989; Krifka, 1995; Chierchia, 1998; Borer, 2005; Huang, 2009; Huang & Lee, 2009; Rothstein, 2010; Zhang, 2013). However, the concepts of count and mass are generally believed to be available across all languages (Ghomeshi & Massam, 2012). Therefore, it is significant to ask how the concepts of count and mass are expressed in Mandarin Chinese. Bearing this question in mind, the present study investigates the relationship of morpho-syntax and semantics as involved in the expression of countability in Chinese *wh*-phrases. In the past decades, the study of Chinese *wh*-phrases has led to a deeper understanding of Chinese grammar and, in a more general sense, Universal Grammar (see Huang, 1982; Cheng, 1991; Tsai, 1994; Lin, 1996; among many others). However, the current literature mostly focuses on a few *wh*-phrases, such as *shenme* ‘what’ and *shei* ‘who’, which only represent a small range of Chinese *wh*-phrases. Furthermore, no study investigates countability as associated with Chinese *wh*-phrases. The vast literature on countability in Chinese is so far limited to the nominal system (Chao, 1968; Hansen, 1983; Graham, 1989; Bach, 1989; Harbsmeier, 1991; Gillon, 1999; Fung, 1991; Krifka, 1995; Doetjes, 1997; Chierchia, 1998; Cheng & Sybesma, 1998, 1999, 2005, 2008; Cheng, 2012; Bo, 1999; Borer, 2005; Huang, 2009; Huang & Lee, 2009; Rothstein, 2010; Zhang, 2013; Liu, 2014). In the present study,

we attempt to broaden the research area and investigate countability as associated with three less studied Chinese *wh*-phrases: *duo-shao* ‘much-little’, *duo-shao-ge* ‘much-little-Classifier’, and *ji-ge* ‘how many-Classifier’, all three of which can be followed by a noun and function as determiners.

We will conduct a comparative study on the expression of countability as associated with *duo-shao*, *duo-shao-ge*, and *ji-ge*. These three *wh*-phrases represent three morpho-syntactically distinct determiners. We investigate the way in which their morph-syntax shapes the countability of their associated nouns. We examine their interpretation and distribution in three linguistic contexts, namely, questions, bare conditionals, and negative statements. These linguistic contexts display both interrogative and non-interrogative uses of the three *wh*-phrases. The interrogative uses are demonstrated in questions, and the non-interrogative uses in bare conditionals and negative statements. Upon careful examination, a systematic pattern is identified among the interrogative and non-interrogative uses of the three *wh*-phrases across the three linguistic contexts: *duo-shao* is an indeterminate determiner and does not specify the countability of its associated nouns, while *duo-shao-ge* and *ji-ge* are count determiners and impose count uses of their associated nouns. This systematic pattern is attributed to one important morpho-syntactic factor: the presence/absence of a classifier in these three *wh*-phrases. That is, the presence/absence of a classifier in the morpho-syntax of the Chinese *wh*-phrases shapes the countability of their associated noun. From a general linguistic perspective, the present study shows that a wide range of diversity and complexity is involved in the distribution and interpretation of Chinese *wh*-phrases, and the variety of Chinese *wh*-phrases can be attributed to their distinct morpho-syntax. In a word, our study suggests that a linguistic form determines its functions.

To elaborate on the general picture presented above, the remaining parts of this paper are arranged as follows. Section 2 examines the distributional and interpretative differences in countability between *duo-shao* ‘much-little’, *duo-shao-ge* ‘much-little-Classifier’, and *ji-ge* ‘how many-Classifier’ in three linguistic contexts: questions, bare conditionals, and negative statements. These three cases are discussed in turn in three subsections. Section 3 discusses the grammatical functions of Chinese classifiers and explains why the presence/absence of a classifier determines countability in these three *wh*-phrases. Section 4 concludes the paper.

2. Distribution and Interpretation of *Duo-shao*, *Duo-shao-ge*, and *Ji-ge*

In this section, we examine the distribution and interpretation of *duo-shao*, *duo-shao-ge* and *ji-ge* in three linguistic contexts: questions, bare conditionals and negative statements. In each linguistic context, the same nouns are used after the three *wh*-pronouns. This allows us to see how the interpretation of nouns in countability is affected by the morpho-syntax of the *wh*-pronouns.

2.1 *Duo-shao*, *duo-shao-ge*, and *ji-ge* in questions

This part examines the interpretation and distribution of the interrogative *duo-shao*, *duo-shao-ge*, and *ji-ge* in questions as related to their countability. Let us start with *duo-shao*. *Duo-shao* consists of a pair of gradable polar antonyms, i.e., the positive polar term *duo* ‘a lot’ and the negative polar term *shao* ‘a little’. It is suggested that the semantic contrast between these polar terms neutralizes and gives rise to an abstract concept, i.e., the superordinate of each of the two polar antonyms, i.e., QUANTITY (Cruse, 1986, pp. 255-257). As a consequence, *duo-shao* functions as a proform denoting any value on a quantity scale ranging from “0” (zero) to “∞” (infinity) (see Huang & Ursini, [in press] on the basic properties of *duo-shao*). This is illustrated in sentence (1).

(1) A: *Ni mai le duoshao pingguo?*

you buy Asp a lot-a little apple

(i) ‘how much apple did you buy?’

(ii) ‘how many apples did you buy?’

B1: *Liang gongjin pingguo*

two CL_{kg} apple

‘Two kgs of apple’

B2: *Liang ge pingguo*

two CL_{ge} apple

‘Two apples’

(1A) shows that *duo-shao* can be followed by the noun *pingguo* ‘apple’, and this sentence is used to seek information on the quantity of apple(s) in question. Two possible interpretations are available for the hearer. First, the hearer may take the question as an inquiry of the *amount* of apple, a reading equivalent to ‘how much apple did you buy?’, as 1(A-i) shows. In this case, the interrogative *duo-shao* takes a ‘how much’ reading, and correspondingly, *pingguo* receives a mass reading—the substance-denoting reading. Therefore, to answer the question, the hearer may respond with 1(B1) *liang gongjin pingguo* ‘two kgs of apple’, in which *gongjin* is a measurement of the amount of apple substance. Alternatively, the hearer may take question (1A) as an inquiry of the *number* of apples, a reading equivalent to ‘how many apples did you buy?’, as 1(A-ii) shows. In this case, a ‘how many’ reading is assigned to *duo-shao*, and *pingguo* receives a corresponding count reading—the individual-denoting reading. On this interpretation, the hearer may respond with 1(B2) *liang ge pingguo* ‘two apples’, in which the individual classifier *ge* carves out a discrete unit of individual apples. So, the interrogative *duo-shao* in (1-A) can be assigned a ‘how many’ reading and a ‘how-much’ reading, and these two uses of *duo-shao* trigger the corresponding count and mass uses of the co-occurring noun *pingguo*. These two possible interpretations and the two distinct types of corresponding answers are equally accessible for the hearer, and no preference is attested if the sentence is interpreted out of context.

In addition to co-occurring with nouns that can denote individual objects, e.g., *pingguo* ‘apple’ as seen in (1), *duo-shao* can appear with nouns that can denote amorphous substances and liquids, such as *shui* ‘water’. This is illustrated in (2) below.

- (2) A: *Ni mai le duoshao shui?*
 you buy Asp a lot-a little water
 ‘how much water did you buy?’
- B1: *Liang sheng shui*
 two CL_{liter} water
 ‘Two liters of water’
- B2: *Liang ping shui*
 two CL_{bottle} water
 ‘Two bottles of water’

In this case, the question sentence *Ni mai le duoshao shui?* ‘how much water did you buy?’ in (2A) seeks information about the amount of water. Moreover, *duoshao shui* in the question (2A) is subject to multiple interpretations. For instance, the hearer can answer with (2-B1) ‘*liang sheng shui*’ ‘two liters of water’, in which the measure word *sheng* ‘liter’ is used. Or, as in (2-B2), the hearer can answer with another numeral classifier containing a container classifier, e.g., *liang ping shui* ‘two bottles of water’. The possibility of answering with multiple expressions that contain distinct types of classifiers suggests that *duo-shao shui* is underspecified in the counting unit.

Based on the interrogative uses of the *wh*-pronoun *duo-shao* in (1) and (2), it can be seen that the interrogative *duo-shao* does not set any restriction on the selection of its associated noun. It can occur with nouns denoting individual objects or amorphous substance/liquids. Moreover, the interrogative *duo-shao* is underspecified with both the ‘how many’ reading and ‘how much’ reading, and correspondingly its associated nouns can receive individual-denoting readings and substance-denoting readings; individual-denoting readings and substance-denoting readings represent count uses and mass uses of nouns respectively. Considering its interpretative and distributional features, it can be concluded that the interrogative *duo-shao* leaves open the countability of its associated nouns. In this regard, *duo-shao* can be characterized as an ‘*indeterminate determiner*’. From a cross-linguistic perspective, *duo-shao* functions like the English *a lot*, which also does not specify the countability of its associated nouns, as stated above.

Next, we proceed to examine the way in which the morpho-syntax of *duo-shao-ge* and *ji-ge* shapes their semantic interpretation in countability. *Duo-shao-ge* has an additional classifier, i.e., *ge*, as compared with *duo-shao*. In the case of *ji-ge*, the individual classifier *ge* is also involved in this *wh*-pronoun’s lexical morphology. The *wh*-pronoun *ji* is a proform for numbers, replacing the number word in the Numeral-CL-N structure, e.g., *san ge pingguo* ‘three-CL-apple’. Note that *duo-shao* and *ji* can be followed by any classifier; in the present study, the individual classifier *ge* has been chosen in the cases of *duo-shao-*

ge and *ji-ge*, because we investigate the individuation function of classifiers, which is an essential feature of countability in Chinese (Huang, 2009; Huang & Lee, 2009).

The interrogative *duo-shao-ge* and *ji-ge* are subject to the same semantic constraints in distribution, and receive the same semantic interpretations. More specifically, these two *wh*-pronouns select only nouns that can denote countable entities, and receive only a ‘how-many’ reading in questions. This is shown in examples (3)-(6).

(3) A: *Ni mai le duoshao ge pingguo?*

you buy Asp a lot-a little CL_{ge} apple

‘how many apples did you buy?’

B1: *Liang ge pingguo*

two CL_{ge} apple

‘Two apples’

* B2: *Liang gongjin pingguo*

two CL_{kg} apple

‘Two kgs of apple’

(4) ??? *Ni mai le duoshao ge shui?*

you buy Asp a lot-a little CL_{ge} water

‘how much water did you buy?’

(5) A: *Ni mai le ji ge pingguo?*

you buy Asp how-many CL_{ge} apple

‘how many apples did you buy?’

B1: *Liang ge pingguo*

two CL_{ge} apple

‘Two apples’

* B2: *Liang gongjin pingguo*

two CL_{kg} apple

‘Two kilograms of apple’

(6) ??? *Ni mai le ji ge shui?*

you buy Asp how-many CL_{ge} water

First of all, while speakers generally consider *duoshao ge pingguo* (see (3A)) and *ji-ge pingguo* (see (5A)) perfectly acceptable expressions, *duoshao ge shui* (see (4)) and *ji-ge shui* (see (6)) are generally considered non-spontaneous, as marked by the question marks preceding the sentences. The grammatical contrast between (3A) and (4) on the one hand, and between (5A) and (6) on the other hand show that *duo-shao-ge* and *ji-ge* can occur with nouns that can denote countable entities, e.g., *pingguo* ‘apple’, but not with nouns denoting amorphous liquid or substance, such as *shui* ‘water’. Moreover, to answer the *duo-shao-ge* and *ji-ge* questions in (3A) and (5A), only expressions that can denote individual objects, e.g., *liang ge pingguo* ‘two apples’ can be used (see (3-B1) and (5-B1)). In other words, the two questions cannot be answered with expressions like *liang gongjin*

pingguo ‘two kilograms of apple’, as marked by the stars in (3-B2) and (5-B2). In this expression, the counting unit *gongjin* ‘kilogram’ does not correspond to the counting unit of individual apples, which is specified by the individual classifier *ge* in the questions. This is because once a counting unit is specified in a *wh*-question with the presence of a classifier, such as the classifier *ge* in (3A) and (5A), countability is precisely fixed, and the *wh*-question can only be answered with a numeral classifier phrase containing the same classifier as in the question. Only in this way can the consistency in countability between the *wh*-question and its corresponding answer be guaranteed. Based on the distribution and interpretation of the interrogative *duo-shao-ge* and *ji-ge*, we can generalize that these two *wh*-phrases are *count determiners*, on par with the count status of English count determiners such as *many*.

To wrap up, the interrogative *duo-shao* differs from the interrogative *duo-shao-ge* and *ji-ge* in interpretation and distribution. The interrogative *duo-shao* is open to the ‘how many’ reading and the ‘how much’ reading. It also freely picks its associated nouns. The co-occurring nouns can receive individual-denoting readings and substance-denoting readings, which represent count uses and mass uses of the nouns respectively. Based on these interpretive and distribution features, it can be held that the interrogative *duo-shao* leaves open the countability of its associated nouns. By contrast, the interrogative *duo-shao-ge* and *ji-ge* are more restricted in interpretation and distribution. They convey the meaning of the English interrogative *how many*, and select only nouns that can denote individual objects. Therefore, the interrogative *duo-shao-ge* and *ji-ge* determine that their associated nouns have to be in count uses. Overall, the distributional and interpretive features suggest that *duo-shao* functions as an indeterminate determiner, while *duo-shao-ge* and *ji-ge* behave as count determiners.

2.2 *Duo-shao*, *duo-shao-ge*, and *ji-ge* in bare conditionals

We have seen the interrogative uses of *duo-shao*, *duo-shao-ge*, and *ji-ge*. As a typological feature of Mandarin Chinese, *wh*-pronouns also have non-interrogative uses, which are subject to certain distributional constraints, and require special linguistic contexts or structures to get licensed (Huang, 1982; Li, 1992; Lin, 1996, 1998). Bare conditionals and negative statements are two linguistic contexts that can license non-interrogative uses of *wh*-pronouns in Chinese. Bare conditionals are considered in this section, leaving the case of negative statements to the next section. In bare conditionals, the *wh*-phrases must come in pairs in the antecedent and in the consequent, and each pair of *wh*-phrases refers to the same, or the same kind of, entities (Cheng & Huang, 1996; Lin, 1996; Chierchia, 2000).

The non-interrogative uses of *duo-shao*, *duo-shao-ge*, and *ji-ge* are consistent with their interrogative uses. In parallel with the distributional and interpretative distinctions between the interrogative *duo-shao*, *duo-shao-ge*, and *ji-ge*, non-interrogative uses of these three *wh*-phrases exhibit similar patterns in bare conditionals. While *duo-shao* sets no restriction on the individuation properties of its co-occurring nouns, and the associated nouns exhibit count uses and mass nouns (receiving both individual-denoting readings

and substance-denoting readings), *duo-shao-ge* and *ji-ge* select only nouns that can denote individual objects, and the associated nouns exhibit only count uses (receiving only individual-denoting readings). To illustrate, consider first the examples in (7)-(9).

- (7) *Xiaogou chi le duoshao li, Xiaomao jiu chi le duoshao li*
 Dog eat Asp a lot-a little pear Cat then eat Asp a lot-a little pear
 (i) (lit.) ‘If Dog ate X amount of pear, Cat then ate X amount of pear.’ (Dog and Cat ate the same amount of pear.)
 (ii) (lit.) ‘If Dog ate X number of pears, Cat then ate X number of pears.’ (Dog and Cat ate the same number of pears.)
- (8) *Xiaogou chi le duoshao ge li, Xiaomao jiu chi le duoshao ge li*
 Dog eat Asp a lot-a little CL_{ge} pear Cat then eat Asp a lot-a little CL_{ge} pear
 (i) (lit.) ‘If Dog ate X number of pears, Cat then ate X number of pears.’ (Dog and Cat ate the same number of pears.)
- (9) *Xiaogou chi le ji ge li, Xiaomao jiu chi le ji ge li*
 Dog eat Asp how-many CL_{ge} pear Cat then eat Asp how-many CL_{ge} pear
 (i) (lit.) ‘If Dog ate X number of pears, Cat then ate X number of pears.’ (Dog and Cat ate the same number of pears.)

In (7)-(9), *duo-shao*, *duo-shao-ge*, and *ji-ge* appear in pairs in the antecedent and consequent of the bare conditionals, and all of the three sentences state that the quantity of pear(s) eaten by Dog and Cat is the same. Moreover, two kinds of quantity are involved here, corresponding to two kinds of quantificational readings: an individual-denoting reading and a substance-denoting reading. In particular, these two readings are both available for the non-interrogative *duo-shao li* in (7), while only the individual-denoting reading is possible for the non-interrogative *duo-shao-ge li* and *ji-ge li* in (8) and (9). Consider the interpretation of *duo-shao li* in (7). In the individual-denoting reading, this sentence means that Dog and Cat ate the *same number* of pears. The individual-denoting reading specifies only the number of the individual pears, and does not address other quantificational information, such as the size or weight of the pears. In this respect, the individual-denoting reading represents a ‘count’ reading. Alternatively, in the substance-denoting reading, this sentence states that Dog and Cat ate the *same amount* of pear. The substance-denoting reading concerns only the amount of the pear substance, and other quantificational information such as the number of pears is irrelevant. In this regard, the substance-denoting reading is a mass reading. Since *duo-shao li* in sentence (7) can denote a ‘count’ reading (the individual-denoting reading) and a ‘mass’ reading (a substance-denoting reading), this *wh*-phrase is underspecified in countability.

The individual-denoting reading and the substance-denoting reading of *duo-shao li* in (7) are equally accessible if this sentence is interpreted out of context. In specific contexts, however, these two readings can be triggered separately through the manipulation of context under distinct felicitous conditions. In another ongoing project, we differentiate these two readings using distinct contexts. Our findings in that project show that the

individual-denoting reading is preferred when only the information on the number of entities is relevant, and the substance-denoting reading is favored when the information on the amount of entities is salient. Details on the empirical studies are not provided here, due to limitation of space.

Next we proceed to consider the interpretation of *duo-shao-ge li* and *ji-ge li* in (8) and (9). These two *wh*-phrases unambiguously convey an individual-denoting reading, namely, that Dog and Cat ate the same number of pears. As stated above, the individual-denoting reading is a count reading. In this reading, other quantificational information, such as the size or weight of the pears, is irrelevant. Importantly, this individual-denoting reading of *duo-shao-ge li* and *ji-ge li* is fixed for the two sentences, no matter how the contextual information is manipulated. This is distinct from the interpretation of *duo-shao li* in (7), which is underspecified in countability, and its interpretation is subject to change in distinct contexts, as discussed above.

Now consider the distribution of *duo-shao*, *duo-shao-ge*, and *ji-ge* in bare conditionals. Like their interrogative counterparts, the non-interrogative *duo-shao*, *duo-shao-ge*, and *ji-ge* in bare conditionals have distinct requirements for the denotation of their associated nouns. Consider (10)-(12).

- (10) *Xiaogou he le duoshao shui, Xiaomao jiu he le duoshao shui*
 Dog drink Asp a lot-a little water Cat then drink Asp a lot-a little water
 (lit.) ‘If Dog drank X amount of water, Cat then drank X amount of water.’ (Dog and Cat drank the same amount of water.)
- (11)???*Xiaogou he le duoshao ge shui, Xiaomao jiu he le duoshao ge shui*
 Dog drink Asp a lot-a little CL_{ge} water Cat then drink Asp a lot-a little CL_{ge} water
 (lit.) ‘If Dog drank X number of water, Cat then drank X number of water.’ (Dog and Cat drank the same number of water.)
- (12)???*Xiaogou he le ji ge shui, Xiaomao jiu he le ji ge shui*
 Dog drink Asp how-many CL_{ge} water Cat then drink Asp how-many CL_{ge} water
 (lit.) ‘If Dog drank X number of water, Cat then drank X number of water.’ (Dog and Cat drank the same number of water.)

The non-interrogative *duo-shao* can be followed with nouns such as *shui* ‘water’, which can denote amorphous substances or liquids, as shown in (10). By contrast, non-interrogative *duo-shao-ge* and *ji-ge* do not naturally co-occur with these kinds of nouns, as illustrated by the examples in (11)-(12). That is, the non-interrogative *duo-shao* can be followed with nouns denoting individual objects and amorphous substances and liquids, while the non-interrogative *duo-shao-ge* and *ji-ge* only select nouns denoting individual objects.

To sum up, in bare conditionals, the non-interrogative *duo-shao* differs from the non-interrogative *duo-shao-ge* and *ji-ge* in interpretation and distribution. *Duo-shao* can co-occur with any noun, and its associated nouns are underspecified in an ‘individual-

denoting' reading and a 'substance-denoting' reading. By contrast, *duo-shao-ge* and *ji-ge* select only nouns that can denote individual objects, and their associated nouns convey only the 'individual-denoting' reading. In a nutshell, the non-interrogative *duo-shao* in bare conditionals has no specific countability of its associated nouns, while *duo-shao-ge* and *ji-ge* in the same linguistic contexts require their associated nouns to be in their count uses. These distributional and interpretive features invite us to generalize that the non-interrogative *duo-shao* functions like an indeterminate determiner, while the non-interrogative *duo-shao-ge* and *ji-ge* behave as count determiners. This is in parallel with the count-mass status of their interrogative counterparts, as discussed in Section 2.1

2.3 *Duo-shao*, *duo-shao-ge*, and *ji-ge* in negative statements

Next we consider the interpretation of *duo-shao*, *duo-shao-ge*, and *ji-ge* when they interact with the negation *mei* 'not'. For the ease of composition, the three negative structures are referred to as the *mei...duo-shao* structure, the *mei...duo-shao-ge* structure, and the *mei...ji-ge* structure. These three structures convey similar but not identical readings. All of the three structures express a 'smallness' reading, but two kinds of 'smallness' are involved here: 'smallness' in number and 'smallness' in amount. The term "'small-number' reading" is used to refer to the 'smallness' in number, and the term "'small-amount' reading" to refer to the 'smallness' in amount.

The *mei...duo-shao* structure differs from the *mei...duo-shao-ge* structure and the *mei...ji-ge* structure in interpretation and distribution. In particular, the *mei...duo-shao* structure can convey both the 'small-number' reading and the 'small-amount' reading, but the *mei...duo-shao-ge* structure and the *mei...ji-ge* structure have only the 'small-number' reading. Consider first the examples (13)-(16) below for the details.¹

- (13) *Xiaozhu mei chi duoshao pingguo*
 Pig Neg eat a lot-a little apple
 (i) 'Pig did not eat many apples.'
 (ii) 'Pig did not eat much apple.'
- (14) *Xiaozhu mei chi ji ge pingguo*
 Pig Neg eat how-many CL apple
 'Pig did not eat many apples.'
- (15) *Xiaozhu mei chi duoshao ge pingguo*
 Pig Neg eat a lot-a little CL apple
 'Pig did not eat many apples.'

In (13), the *mei...duo-shao* structure can convey two readings: (i) Pig did not eat many apples; (ii) Pig did not eat much apple. In the first reading, this sentence conveys that the cardinality of the apples eaten by Pig is small; by implicature a 'small-number' reading is inferred in this sentence (Huang & Crain, 2014). In this reading, the counting unit is individual apples. Other quantificational information, such as amount or size of the

apples, is not specified. In this regard, the ‘small-number’ reading is a count reading. In the second reading, (13) expresses that *the amount* of apple eaten by Pig is small. This interpretation gives rise to an inferred ‘small-amount’ reading. In this reading, the counting unit can be a standard measure, e.g., kilograms. Unlike the ‘small-number’ reading, the ‘small-amount’ reading does not specify anything about the number of apples. The number of apples is not necessarily small. It is possible that there are quite a few apples, but the apple substance constitutes only a small amount. Therefore, the ‘small-amount’ reading is a mass reading. Since the *mei...duo-shao* structure in (13) can convey both a count reading (the ‘small-number’ reading) and a mass reading (the ‘small-amount’ reading), it is underspecified in countability.

Now, consider the interpretation of the ‘*mei...ji-ge*’ structure and the ‘*mei...duoshao-ge*’ structure in (14) and (15). These two sentences express the meaning that Pig did not eat many apples. As stated above, this reading suggests that the cardinality of the apples eaten by Pig is small, and it is a ‘small-number’ reading. Since the ‘small-number’ reading is a count reading, the ‘*mei...ji-ge*’ structure and the ‘*mei...duoshao-ge*’ structure allow only a count use.

The next three examples demonstrate the distributional constraints of the three *wh*-phrases in the negative structure. In this context, *duo-shao* differs from *ji-ge* and *duo-shao-ge* in its noun selection. While it is acceptable to attach nouns denoting amorphous substance or liquids, such as *shui* ‘water’, to the *mei...duo-shao* structure (see (16)), it is not natural to do so for the *mei...ji-ge* structure and *mei...duo-shao-ge* structure (see (17) and (18)).

- (16) *Xiaozhu mei he duo-shao shui*
 Pig Neg drink a lot-a little water
 ‘Pig did not drink much water.’
- (17) **Xiaozhu mei he ji ge shui*
 Pig Neg drink how-many CL water
- (18) **Xiaozhu mei he duo-shao ge shui*
 Pig Neg drink a lot-a little CL water

In conclusion, the *mei...duo-shao* structure can convey a count reading (‘small-number’) and a mass reading (‘small-amount’). This structure does not impose any restrictions on the associated noun. By contrast, the *mei...duo-shao-ge* structure and the *mei...ji-ge* structure express only a count reading (‘small-number’), and they select only nouns that can denote individual objects. Based on the interpretative and distributional features of the three negative structures, we conclude that *duo-shao* is an indeterminate determiner, and *duo-shao-ge* and *ji-ge* are count determiners in this negative context.

This paper has thus far illustrated the distinct theoretical properties of the *mei...duo-shao* structure, the *mei...duo-shao-ge* structure, and the *mei...ji-ge* structure. We have also conducted empirical investigations on this topic. Huang and Crain (2014) and Huang and

Ursini (in press) investigated how Mandarin-speaking children acquire the interpretation of the *mei...ji-ge* structure and the *mei...duo-shao* structure. Similar test materials were used for these two studies. The findings show that Mandarin-speaking children undergo different developmental patterns to acquire the adult-level interpretation of these two negative structures containing *ji-ge* and *duo-shao*. In particular, children undergo three developmental stages to acquire the adult-level interpretation of the *mei...ji-ge* structure, but they undergo two stages to acquire the adult-level interpretation of the *mei...duo-shao* structure. The developmental patterns are attributed to the morpho-syntactic properties of *ji-ge* and *duo-shao* (the two studies can be referred to for details). Based on these theoretical and empirical investigations of the negative statements containing *duo-shao*, *duo-shao-ge*, and *ji-ge*, it can be concluded that the morpho-syntactic properties of Chinese *wh*-phrases affect not only their theoretical properties, but the developmental course in Mandarin-speaking children.

Summing up this section, a systematic pattern is identified in the uses of *duo-shao*, *duo-shao-ge*, and *ji-ge* in three linguistic contexts: questions, bare conditionals, and negative statements. Across the three linguistic contexts, *duo-shao* displays both count readings and mass readings, while *duo-shao-ge* and *ji-ge* convey only count readings. In particular, in questions, *duo-shao* is open to both the ‘how many’ reading (a count reading) and the ‘how much’ reading (a mass reading), while *duo-shao-ge* and *ji-ge* express only the ‘how many’ reading. In bare conditionals, *duo-shao* can receive both the individual-denoting reading and the substance-denoting reading, while *duo-shao-ge* and *ji-ge* only convey the individual-denoting reading. In negative statements, *mei...duo-shao* sentences can express the ‘small-number’ reading and the ‘small-amount’ reading, while *mei...duo-shao-ge* sentences and *mei...ji-ge* sentences can only express the ‘small-number’ reading. The ‘how-many’ reading, the individual-denoting reading, and the ‘small-number’ reading all involve the concept of the number of individual objects, therefore, they all represent count uses of the three *wh*-phrases. By contrast, the ‘how-much’ reading, the substance-denoting reading, and the ‘small-amount’ reading all concern the concept of amount of substances, and hence represent mass uses of the three *wh*-phrases.

Moreover, the distribution of *duo-shao*, *duo-shao-ge*, and *ji-ge* in the three linguistic contexts also display a consistent pattern. Across the three linguistic contexts, *duo-shao* freely occurs with any noun, while *duo-shao-ge* and *ji-ge* require the associated nouns to denote individual objects. These distributional features also suggest that *duo-shao* is underspecified in countability, and *duo-shao-ge* and *ji-ge* function as count terms.

The interpretive and distributional properties of *duo-shao*, *duo-shao-ge*, and *ji-ge* across the three linguistic contexts converge to one point: *duo-shao* is underspecified in countability and functions as an indeterminate determiner, while *duo-shao-ge* and *ji-ge* function as count determiners. We assume that the systematic interpretive and distributional distinctions between *duo-shao* on the one hand, and *duo-shao-ge* and *ji-ge* on the other hand, have to do with their morpho-syntax, particularly, the presence/absence of a classifier. The individual classifier *ge* is involved in the case of *duo-*

shao-ge and *ji-ge*, and no classifier is involved in the morpho-syntax of *duo-shao*. The presence/absence of the individual classifier *ge* in the three *wh*-phrases determines their interpretive and distributional properties. This is particularly clear when comparing the *duo-shao* sentences and the *duo-shao-ge* sentences in the three linguistic contexts. These two types of sentences constitute minimal pairs, differing from each other only in one aspect: the presence/absence of the individual classifier *ge*. This morpho-syntactic factor determines that these two types of sentences systematically differ from each other in their interpretation and distribution. One may wonder why the existence of a classifier plays such an important role in shaping the use of Chinese *wh*-phrases. To answer this question, the grammatical functions of Chinese classifiers will be examined in the next section.

3. The Grammatical Functions of Classifiers

It has been shown that the presence/absence of a classifier in the morpho-syntax of a *wh*-phrase determines the count-mass status of the *wh*-phrase, which in return shapes the interpretation and selection of the co-occurring noun. These observations clearly suggest that classifiers play the most decisive role in shaping countability in Chinese. Indeed, as a topological feature of Mandarin Chinese, countability is encoded and expressed in classifiers. This can be illustrated in a more direct way by looking into the interpretation of classifiers in the nominal system. This is the main task in the following section.

In the Chinese nominal system, the countability of a noun is determined by its co-occurring classifier. In the absence of a classifier, a bare noun (i.e., a noun without a classifier) does not specify its countability. This can be illustrated by the interpretive differences between the bare noun *pingguo* in (19) and the classifier-noun structure *ge-pingguo* in (20).

- (19) *Panzi li you pingguo*
 plate in exist apple
 a. ‘There is an apple on the plate.’
 b. ‘There are some apples on the plate.’
 c. ‘There is an apple chunk on the plate.’
 d. ‘There are some apple chunks on the plate.’
 e. ‘There is some mashed apple on the plate.’

- (20) *Panzi li you ge pingguo*
 plate in exist CL apple
 ‘There is an apple on the plate.’

In (19), the bare noun *pingguo* ‘apple’ conveys multiple readings. It can denote one or more individual apples, one or more individual apple chunks, and even apple purée (Huang 2009: 40). These readings are equally accessible for native speakers, and no preferences

are attested if this sentence is interpreted out of context. For comparison, one notes that, in (20), with the presence of an individual classifier *ge*, only one reading is possible: ‘there is an individual apple object on the plate’. In this case, the individual classifier *ge* selects one particular semantic value for the interpretation of the noun *pingguo*: the semantic value of being individual apples. Furthermore, the quantificational value in (20) is restricted to ‘singular’.

The interpretation of *pingguo* will shift to a different semantic value when a different classifier is used. This is shown in (21), in which a partitive classifier *kuai* ‘chunk’ is used. This sentence states that there is an apple chunk on the plate. So, the insertion of a partitive classifier *kuai* ‘chunk’ selects the semantic value of being an apple chunk. The quantificational value is also restricted to ‘one’, just as in (20).

- (21) *Panzi li you kuai pingguo*
 plate in exist CL apple
 ‘There is an apple chunk on the plate.’

Note that sentence (19) and sentences (20)-(21) constitute two minimal pairs (i.e., (19) vs.(20); (19) vs. (21)), with the presence or absence of a classifier. Thus, their interpretive differences can be attributed to the presence of the classifiers. This brings us to the explanation of the grammatical functions of Chinese classifiers.

In (20)-(21), no number word is involved and, as introduced above, these two sentences unambiguously denote the *quantificational* value of ‘one’. This is due to the quantification function of Chinese classifiers, following the terminology of Borer (2005), Huang (2009), and Huang and Lee (2009). Crucially, all Chinese classifiers have the quantification function (Greenberg, 1972; Au Yeung, 2005; Krifka, 1995, 2008; Huang, 2009; Huang & Lee, 2009; Zhang, 2013). This function is *inherent* for Chinese classifiers (Huang, 2009; Huang & Lee, 2009; Zhang, 2013). This basic function of Chinese classifiers is acquired early by children as young as three years old, as reported by Huang (2009) and Huang and Lee (2009).

In addition to the quantification function, Chinese classifiers have individuation functions of various kinds. These kinds of functions allow classifiers to select various semantic values for their associated nouns, and each semantic value concerns one aspect of the individuation properties of the nouns. Back to (20)-(21); the two distinct classifiers, *ge* and *kuai*, select two distinct semantic values: while the individual classifier *ge* in (20) picks the semantic value of being an individual apple, the partitive classifier *kuai* in (21) picks the semantic value of being an apple chunk. This explains the change of sense in the interpretation of *pingguo* in these two cases. In the absence of a classifier, the semantic value of a bare noun remains underspecified. This is the case for the interpretation of the bare noun *pingguo* in (19). In short, the account of countability in the nominal system suggests that it is the morph-syntactic properties (i.e., classifiers) that determine countability of nouns in Chinese.

Now we are ready to explain the interpretative and distributional properties of the *wh*-phrases *duo-shao*, *duo-shao-ge*, and *ji-ge*, as discussed in Section 2. In the cases of *duo-shao-ge* and *ji-ge*, the presence of the individual classifier *ge* carves out a counting unit, due to its quantification function. Moreover, this counting unit corresponds to individual objects, a requirement imposed by the individuation function of *ge*. The encoding of the quantification and individuation functions of *ge* make *duo-shao-ge* and *ji-ge* function as count determiners, allowing only ‘count’ readings and selecting only nouns that can denote individual objects. In the case of *duo-shao*, no classifiers are involved. Therefore, no fixed counting unit is specified in the interpretation of *duo-shao* and its associated nouns. This explains why *duo-shao* behaves as an indeterminate determiner, and is flexible with regard to whether it receives a ‘count’ reading or a ‘mass’ reading.

Finally, let us highlight two parallels between the nominal system and the *wh*-pronoun system in the encoding of countability. First, both the phrase *duo-shao*-N in the *wh*-pronoun system and bare nouns in the nominal system are underspecified in countability, due to the lack of a classifier in their lexical morphology. Second, the phrases *duo-shao-ge* and *ji-ge* in the *wh*-pronoun system and individual classifier-noun structures (e.g., *ge*-N) in the nominal system convey only count readings, due to the individuation function of individual classifiers. These two parallels suggest that in both systems, the presence/absence of a classifier shapes countability, and classifiers function in similar ways in both systems.

4. Conclusion

The present paper investigates the relationship between function (morpho-syntax) and form (semantic interpretation) as involved in the expression of countability in the Chinese *wh*-pronoun system. Through examining the interpretation and distribution of *duo-shao*, *duo-shao-ge*, and *ji-ge* in three linguistic contexts (questions, bare conditionals, and negative statements), we conclude that while *duo-shao* is an indeterminate determiner, allowing both count readings and mass readings, *duo-shao-ge* and *ji-ge* are both count determiners, allowing only count readings. The count uses of *duo-shao-ge* and *ji-ge* are attributed to the presence of the individual classifier *ge* in their morpho-syntax, and the underspecification in countability in the uses of *duo-shao* are attributed to the lack of a classifier. The present study also shows that variety exists in the expression of countability in the Chinese *wh*-pronoun system. However, the variety can be largely attributed to the distinct morpho-syntax of the *wh*-pronouns, particularly the presence/absence of a classifier. In this regard, this study shows that a linguistic form determines its functions.

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Note

- 1 See Huang and Crain (2014) for the derivation of the 'small-number' reading in the *mei...ji-ge* structure, and Huang and Ursini (in press) for the interpretation of the *mei...duo-shao* structure.

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