ORDINAL PHRASES AND THE PROJECTION OF DP IN MANDARIN CHINESE[*]

Hui-Chin Tsai
Feng Chia University
National Taiwan Normal University

ABSTRACT

This paper discusses the *di* ordinal phrase [*di* + Num + Cl + N] (henceforth *di* ordinals) in Mandarin Chinese. We demonstrate that Barbiers' (2007) feature classification system for numerals is not applicable to Mandarin Chinese. Also, we argue that the properties of *di* ordinal phrases cannot be adequately accounted for by the superlative analysis proposed by Bhatt and Pancheva (2012). To address these issues, we propose a nominal analysis of Mandarin *di* ordinals, wherein the prefix *di*, denoting an ordering reading, functions as an underspecified D-element with respect to definiteness features. Our proposed analysis not only explains properties of *di* ordinal phrases but also provides an explanation for counterexamples found in H.-C. Tsai (2011).

Keywords: Ordinal construction, definiteness, numerals, underspecified analysis, feature analysis, DP

1. INTRODUCTION

Mandarin Chinese numeral expressions, known as cardinal numerals, have been extensively studied in constructions like [Num + Cl + N] in (1) (Cheng and Sybesma 1999). However, less attention has been given to another type of numeral formation called ordinals. In Mandarin Chinese, ordinals take the form [*di* + Num + Cl + N] (henceforth *di* ordinals), where the prefix *di* with the meaning of order is added before the Num-Cl-N sequence, as shown in (2) (see Lu et al. 1980; Liu et al. 2001).[1]

(1) san-ben   shu
    'three-CL   book'
    'three books'

(2) di   san-ben   shu
    di   three-CL   book'
    'the/a third book'

As discussed by Hurford (1987) and Veselinova (1997), ordinals are inherently definite since they select and indicate a specific point from an ordered sequence of objects set within a certain context. Extending Hurford's (1987) and Veselinova's (1997) analyses further, Barbiers (2007) argues that the ordinal suffix *-de* '*th*' in Dutch imposes a definiteness restriction on numerals.[2]

When we examine Mandarin Chinese, special attention needs to be given to the *di* ordinal phrase in (3) because it is, in fact, ambiguous between a definite unique reading and an indefinite quantity reading (H.-C. Tsai 2011).

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[1] Abbreviations used in this paper are as follows: CL: classifier; DE: verbal suffix or marker for modifying phrases like genitive phrases and relative clauses; ASP: aspect marker; SFP: sentence-final particle; DEM: demonstrative.

[2] For a detailed discussion, please refer to section 3.1 in this paper.

(from H.-C. Tsai 2009, 2011)

(3) Zhangsan   mai-le   di   san-dong   fangzi.
    Zhangsan   buy-ASP   di   three-CL   house
    a. 'Zhangsan bought a house, which is the third in a row.'
       [definite]
    b. 'Zhangsan already had two houses, and he bought another one.'
       [indefinite]

On the definite unique interpretation of (3), there is only one unique house, which is the third in order among a row of houses. On the indefinite quantity interpretation, the sentence can be understood in terms of the following scenario: the speaker knew that Zhangsan owned two houses, and he/she also knew that Zhangsan bought another one. It is noticeable that this indefinite quantity-denoting *di* ordinal can only refer to a single entity in a numerical sequence, rather than a sum of entities expressed in cardinal numerals [Num + Cl + N] in (1), as shown by the contrast below:

(4) Zhangsan   zuotian   mai-le   liang-ben shu, jintian
    Zhangsan   yesterday   buy-ASP   two-CL   book today
    mai-le   yi-ben   shu.   Ta   zonggong   mai-le
    buy-ASP   one-CL   book.   He   totally   buy-ASP
    *di san-ben   shu/san-ben   shu.
     di three-CL book/three-CL   book
    'Zhangsan bought two books yesterday and one book today.
    He bought *a third book/three books in total.'

Before presenting our analysis, we will first review the two analyses: Barbiers' (2007) new feature classification system for numerals and superlative analysis of ordinals (see Bhatt 2006; Sharvit 2010; Bhatt and Pancheva 2012). We will argue that these two analyses cannot accommodate properties of *di* ordinals. Unlike many languages with a suppletive form for *FIRST*, Mandarin has regular ordinal phrases, challenging Barbiers' (2007) claim that cardinal numeral ONE, different from other cardinals, lacks the feature [definite] and [divided]. Furthermore, we propose that issues related to *di* ordinals should be resolved under nominal analysis rather than through a superlative analysis

of the adjectival domain. We analyze the morpheme *di* with an ordering reading as a D-related element underspecified for definiteness, with its concrete interpretation determined by the C-I system in each discourse situation. The two readings of (3) correspond to the English sentences (5a) and (5b), respectively.

(from H.-C. Tsai 2009, 2011)
(5) a. Zhangsan bought the third house.
   b. Zhangsan bought a third house.

This paper proceeds as follows: Section 2 provides a detailed discussion on the syntax and semantics of *di* ordinals in Mandarin Chinese, helping us formalize the questions addressed in this paper. Section 3 reviews previous studies on ordinals, and our analysis is presented in section 4. Finally, section 5 concludes the paper.

2. SYNTACTIC AND SEMANTIC PROPERTIES OF MANDARIN ORDINALS

The morpheme *di* originated from the noun 'order' and grammaticalized as a prefix in Han, according to Ōta (1987). As extensively discussed in H.-C. Tsai (2009, 2011), *di* ordinals can have a definite unique reading or an indefinite quantity reading. The interpretations of *di* ordinals are affected by syntactic positions, aspect markers or predicate types. For instance, ordinals can appear freely in subject position or topic position of a sentence where a definite unique reading is obtained, as shown in (6).

(from H.-C. Tsai 2009, 2011)
(6) a. Di   liu-ge   xuesheng   qu-guo   Meiguo.
      di   six-CL   student   go-ASP   America
      'The sixth student has the experience of going to America.'

    b.   Di   liu-ge   xuesheng, wo   zhidao   qu-guo
             di   six-CL   student   I   know   go-ASP
             Meiguo.
             America
             'Regarding the sixth student, I know he has the experience of
             going to America.'

In (6), the ordinal phrase *di liu-ge xuesheng* 'the sixth student' refers to a person known to both the speaker and the hearer. However, if the existential morpheme *you* 'have' is added, an indefinite quantity reading is obtained; the ordinal phrase *di shier-ge qiuyuan* 'a twelfth player' in (7) is interpreted as an indefinite quantity reading, referring to a nonspecific redundant player on the field.

    (from H.-C. Tsai 2009, 2011)
(7) Fangui!   you   di   shier-ge   qiuyuan   zai
     Foul!   have   di   twelve-CL   player   on
     qiuchang   shang.
     field   up
     'Foul! There is a twelfth player on the football field.'
     (In American football, only eleven players can be on the field during
     play.)

When *di* ordinals appear in object position, they have many possible interpretations. Some object ordinals may be ambiguous between a definite unique reading and an indefinite quantity reading, while others may have only one available interpretation.

We first consider sentences along with the verbal aspect marker *-le*. In examples such as (3) (repeated as (8)), when an ordinal phrase occurs with the verbal aspect marker *-le*, it gives rise to a definite unique reading and an indefinite quantity reading.

(8) Zhangsan   mai-le   di san-dong fangzi.
    Zhangsan   buy-ASP   di three-CL house
      a. 'Zhangsan bought a house, which is the third in a row.'
        [definite]
      b. 'Zhangsan already had two houses, and he bought another one.'
        [indefinite]

Similarly, if the sentence final particle *-le* is involved, *di* ordinals are also ambiguous.

(from H.-C. Tsai 2009, 2011)
(9) Zhangsan   chi di   san-ke   pingguo   le.
    Zhangsan   eat di   three-CL apple   SFP
      a. 'Zhangsan started eating the third apple.'   [definite]
      b. 'Zhangsan ate a third apple.'   [indefinite]

Traditionally, the sentence final particle *-le* is analyzed as an inchoative or change-of-state marker (e.g, Teng 1975; Chao 1968; Zhu 1982). Both of the readings in (9) can be viewed this way. On the one hand, the situation where Zhangsan started eating the third apple of three (or more) in a sequence involves one kind of change of state: from not eating to eating. In this circumstance, we get a definite reading of *di san-ke pingguo*. On the other hand, when the speaker has the background knowledge that Zhangsan ate two apples previously and Zhangsan ate an apple again, the process of adding up the amount of apples which Zhangsan had can be viewed as a kind of change of state, say, two apples plus one apple equals three apples, and an indefinite quantity reading is therefore expected. This example also verifies the presupposition of the existence of n entities and $n =$ Num-1 in the pattern [*di* + Num + Cl +N]. This presupposition remains when the sentence is negated as in (10). Namely, for an indefinite reading (10a), the existence of two apples that Zhangsan already ate can be verified even if negation is involved.

(10) Zhangsan yijin   chi-le   liang-ke   pingguo.
      Zhangsan already   eat-ASP   two-CL   apple
      Ta   bu   (xiang)   chi   di   san-ke   pingguo   le.
      he   not   want   eat   di   three-CL   apple   SFP
      a. 'Zhangsan already ate two apples, and he did not want to eat the third one.'[definite]
      b. 'Zhangsan already ate two apples, and he did not want to eat a third one.' [indefinite]

Let us then consider *di* ordinals appearing with the aspect marker *-guo*, which requires that the eventuality modified by it should be repeatable (see Lin 2005, Wu 2008).

      (from H.-C. Tsai 2009, 2011)
(11) Zhangsan du-guo   di   san-ben   shu. [definite]
      Zhangsan read-ASP   di   three-CL book
      a. 'Zhangsan had the experience of reading the third book.'
      b. #'Zhangsan had the experience of reading a third book.'

Sentence (11) can be understood as follows: there was a list of books on the shelf, and the third one in order was read by Zhangsan. The referent of this definite *di san-ben shu* was not only the theme of the first book-reading event but also the theme of any other potentially repeated book-reading event. This gives rise to a unique definite reading of *di san-ben shu* 'the third book'. Noticeably, an indefinite quantity reading is disallowed in (11) because it is impossible to conduct and repeat the book-reading event if no such book exists.

As discussed in (8), an ordinal expression in sentences with the verbal aspect marker *-le* can be ambiguous between a definite unique reading and an indefinite quantity reading. An ordinal phrase in (12), however, only assumes an indefinite quantity reading.

      (from H.-C. Tsai 2009, 2011)
(12) Zhangsan chi-le   di   san-bang   yingtao. [indefinite]
      Zhangsan eat-ASP   di   three-pound   cherry
      'Zhangsan ate a third pound of cherries.'

Interestingly enough, a definite reading emerges if an abstract measure word like *bang* 'pound' is replaced by a concrete classifier like *dai* 'bag' as in (13).

(from H.-C. Tsai 2009, 2011)
(13) Zhangsan chi-le   di   san-dai   yingtao.
       Zhangsan eat-ASP   di   three-bag cherry
       a. 'Zhangsan ate the third bag of cherries.'   [definite]
       b. 'Zhangsan ate a third bag of cherries.'   [indefinite]

Along the same line of reasoning, sentences with the verbal aspect marker *-le* can be disambiguated, if containing creation predicates.

(from H.-C. Tsai 2009, 2011)
(14) Xiaomei   zuotian   sheng-le   di   san-ge
       Xiaomei   yesterday   give birth to-ASP   di   three-CL
       xiaohai.
       child
       'Xiaomei gave birth to a third child yesterday.'

The lexical semantics of creation predicates, such as *giving birth to*, assumes that the existence of the child cannot be possible unless the action denoted by the predicate is performed. To phrase it differently, it is implausible to choose or select a definite or specific baby prior to giving birth to one. Sentence (14) is felicitous in the context where Xiaomei had two babies; when she gave birth to a baby again, this baby was counted as a third one that she had. An indefinite quantity reading is therefore expected.

In brief, *di* ordinals in Mandarin Chinese may allow a broader range of interpretations than those initially documented by Hurford (1987) and Veselinova (1997). In what follows, we shall examine prior analyses of ordinal phrases before presenting our own analysis.

3. PREVIOUS ANALYSES

After laying out interpretational properties of *di* ordinals, we shall discuss previous proposals on ordinal constructions in the literature. First, Barbiers (2007) argues that definiteness arises from the suffix *-th*. The cardinal numeral ONE, unlike other cardinal numerals, lacks the feature [+definite]. The incompatibility between ONE and *-th* results in the suppletive form of the ordinal FIRST. Moving forward, we will explore analyses that treat ordinals and superlatives in a similar manner. However, we will argue that the characteristics of *di* ordinal phrases in Mandarin cannot be subsumed under the superlative analysis.

3.1 Barbiers' (2007) Analysis

Examining Dutch ordinal formation, Barbiers (2007) argues that the strong universal tendency for suppletion in the case of FIRST is neither an underivable irregularity of languages nor a vestige of earlier language stages. Instead, a new classification system for the features of numerals is proposed to account for the obligatory suppletion of FIRST.

Traditionally, the feature [definite] is used in DP domains to distinguish between definite and indefinite noun phrases. Barbiers posits that this [definite] feature can be applied to DPs because it involves a linear ordering of an element relative to the deictic center, i.e., an external ordering. Similarly, Barbiers proposes that the feature [definite] can be applied to numerals since numerals involve a linear ordering of elements within a set, i.e., an internal ordering. Specifically, the cardinal numeral ONE lacks a linear ordering as it refers to a singleton, and therefore does not possess the feature [definite]. This distinguishes the cardinal numeral ONE from other cardinal numerals that do possess the feature [definite]. In addition, Barbiers claims that the cardinal numeral ONE lacks the feature [divided] as its singleton property is internally unordered and represents an undivided set. However, the formation of ordinal forms with the suffix *-th* necessitates a numeral with the feature specification [divided] [definite]. Consequently, the cardinal numeral ONE cannot be combined with the ordinal suffix *-th*, leading to the creation of the suppletive form FIRST.

Barbiers (2007) provides evidence in Dutch to support the indefiniteness nature of the cardinal numeral ONE, as it patterns with indefinite DPs, while plural cardinals pattern with definite DPs. One such piece of evidence arises from its behavior under modification by *so*, as illustrated below:

(from Barbiers 2007)

(15) a.　Zo　één/*twee　heb　　ik　　er　　　ook.
　　　　　so　one/two　have　　I　　there　　too
　　　　　'I have one like that.'

　　　b.　*Zo　　　het　boek　wil　　ik　ook.
　　　　　so　　　the　book　want　I　too

Further support for the intrinsic indefiniteness of the cardinal numeral ONE is derived from certain Dutch varieties wherein ONE assumes the role of a high-degree focus marker within DP. It is noteworthy that this particular usage of ONE is only compatible with indefinites.

(from Barbiers 2007)

(16) High degree focus marker ONE requires indefinites
　　a. Gè　zet　unnen　　arig-en　　　(inne)　Northern Brabantish
　　　　you are　a.MASC　strange.MASC　(one.MASC)
　　b. Do　bist　in　rar-en　　　　(ien)　　　　　Frisian/Groningen
　　　　you are　a　strange-AFF　(one)
　　c. Diej-en　　blond-en　　(*inne)die　ken　ik Northern Brabantish
　　　　that.MASC blond.MASC　(one)that　know I
　　d. de　read-e　　(*ien)　　　　　　　　Frisian/Groningen
　　　　the　red-G　　(one)

Now, let us shift our focus to ordinal formation in Mandarin Chinese. Contrary to Barbiers' (2007) claim, ordinal formation in Mandarin is quite regular, and all ordinals have a consistent derivational form by placing the morpheme *di* in front of the sequence Num-Cl-N, as shown in (17).

(17) di   yi/shi-ben   shu
    di   one/ten-CL   book'
    'the/a first/tenth book'

In addition, in Mandarin, the cardinal numeral ONE differs from other cardinals, but the situation contrasts with what was discussed for Dutch by Barbiers (2007). In Mandarin, it is the cardinal numeral ONE that possesses a higher degree of specificity or definiteness compared to other plural cardinal numerals.

According to Tsai (2002), in Mandarin, the cardinal numeral *yi* 'one', unlike other plural cardinals, can co-occur with the typical specific determiner *mou* 'certain', as shown in (18). This restriction on co-occurrence indicates that *yi* 'one' exhibits a high specificity property, and similar cases can be found in English, as demonstrated in (19).

    (from Tsai 2002)
(18) a. mou   yi-ge   ren   lai   zao-guo   ni.
       certain one-CL   person   comelook for-ASP   you
       'A certain person came looking for you.'
    b.* mou   lian-ge   ren   lai   zao-guo   ni.
        certain two-CL   person   comelook for-ASP   you
    c.*mou   san-ge   ren   lai   zao-guo   ni.
       certain three -CL person   comelook for-ASP   you

(19) a. A certain person came here to look for you.
    b. * Two certain persons came here to look for you.
    c. * Three certain persons came here to look for you

Furthermore, additional examples illustrating the high specificity of the numeral *yi* 'one' in Mandarin are presented in the following contrast:

(from Tsai 2002)

(20) a. yi-ge   kelian   xixi   de   ren   lai
        one-CL pitiful   extremely   DE   person   come
        zao-guo   ni.
        look for-ASP   you
        'An extremely pitiful person came to look for you.

   b. *san-ge   kelian   xixi   de   ren   lai
        three-CL   pitiful   extremely   DE   person   come
        zao-guo   ni.
        look for-ASP   you
   Intended: 'Three extremely pitiful persons came to look for you.'

It is widely known that subject or topic positions in Mandarin typically do not allow indefinite noun phrases. However, a nominal expression with the cardinal numeral *yi* 'one' in (20a) shows high specificity and can appear in these positions, whereas the expression with the cardinal *san* 'three' in (20b) cannot (Chao 1968; Li and Thompson 1981; Lee 1986; Shyu 1995; Tsai 1994, 1996, 2001, among many others).

In summary, it is inappropriate to apply Barbiers' classification of numerals to analyze *di* ordinal phrases in Mandarin Chinese, as Mandarin lacks a suppletion form for the formation of the ordinal FIRST. Unlike Barbiers' claim that plural cardinals in Dutch are inherently definite, it is actually the cardinal numeral *yi* 'one' in Mandarin that exhibits higher specificity compared to other plural cardinals. Also, Barbiers (2007) only concentrates on the definite nature of ordinals, thereby failing to explain the ambiguity of Mandarin *di* ordinal phrases.

3.2 Unified Analyses for Superlatives and Ordinals

Relatively little attention has been given to the issue of ordinals. Previous studies have primarily focused on the assumption that ordinals share the same syntax and semantics as superlatives, particularly regarding certain grammatical features (see Bhatt 2006; Sharvit 2010; Bhatt and

Pancheva 2012). [3] For example, both ordinals and superlatives may express the same concept. It is possible to refer to the same train using an ordinal phrase (i.e., *the first train* in (21a)), or a superlative (i.e., *the earliest train* in (21b)), as indicated by Bylinina et al. (2014). In Japanese, the two items are expressed by the same or related morpheme. Bylinina et al. (2014) specifically point out that the English sentences in (21) can be translated into Japanese counterparts with the word *ichiban*, as shown in (22).

(from Bylinina et al. 2014:3)

(21) a. The first train from Gare du Nord left at 6:43 am.
     b. The earliest train from Gare du Nord left at 6:43 am.

(22) a. Kita-eki-hatsu-no   **ichiban**-me-no   densha-wa
     North-Station-from   ICHIBAN-ME-GEN train-TOP
     6:43-ni deta.
     6:43-at left
     'The first train from Gare du Nord left at 6:43.'

     b. Kita-eki-hatsu-no   **ichiban** hayai   densha-wa
     North-Satation-from   ICHIBAN early   train-TOP
     6:43-ni deta.
     6:43-at left
     'The earliest train from Gare du Nord left at 6:43.'

Let's consider *di* ordinals in Mandarin Chinese. The two sentences in (23) seem to be truth-conditionally equivalent. That is, *di-yi ban huoche* 'the first train' means *zui zao ban huoche* 'the earliest train', and one might argue that the superlative analysis of ordinals is plausible.

(23) a.   Zhangsan xiang   da di yi ban huoche.
     Zhangsan want   take di one time train
     'Zhangsan wants to take the first train.'

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[3] Bylinina et al. (2014) argue against a unified account of ordinals and superlatives because ordinals do not give rise to upstairs *de dicto* readings.

b. Zhangsan   xiang   da zui   zao   ban
   Zhangsan   want   take most   early   time
   huoche.
   train
   'Zhangsan wants to take the earliest train.'

However, a unified account of superlatives and ordinals may face the following challenges. First, the phrase *di yi ban* 'the first time' in (23a) has a different structure compared to the ordinal construction discussed in this paper. Our main focus is on ordinal expressions in the form of [*di* + Num + Cl + N], where classifiers are used to count nouns. For example, the classifier *liang* in *di san-liang huoche* 'the/a third train' is used for counting the noun *train*. However, in (23a), the morpheme *ban* 'time' is not used to count the quantity of trains. Instead, it specifically serves to quantify the number of times an action occurs. The example in (23a) can be analyzed as (24) with the omission of the general classifier *ge* and the noun *ci* 'time'.

(24) Zhangsan   xiang   da   di   yi-**ge**   ban**ci**   huoche.
    Zhangsan   want   take   di   one-CL   time   train
    'Zhangsan wanted to take the first train.'

Second, the ordinal number discussed in this paper is not limited to *yi* 'one', as shown in (25). It is implausible to replace *di er-ban huoche* 'the second train' in (25) with the superlative marker *zui* 'most' and the adjective *zao* 'early'.

(25) Zhangsan   xiang   da   di-er   ban   huoche.
    Zhangsan   want   take   di-two   time   train
    'Zhangsan wanted to take the second train.'

The preceding deliberation highlights the inadequacy of the superlative approach in explaining the properties of the ordinal phrase [*di* + Num + Cl + N] discussed in this paper. The presence of classifiers within this type of ordinal phrase suggests an alternative analysis that the *di*

ordinal phrases should be accounted for from the framework of nominal domains.

4. TOWARD AN ACCOUNT

In this section, we aim to explore an account for the properties of the *di* ordinal phrases by attributing them to nominal domains. This raises the question of whether languages lacking overt articles, such as Mandarin Chinese, should possess a DP projection. To address this question, we will provide evidence supporting the claim that *di* ordinals project a DP projection. Furthermore, we will review H.-C. Tsai's (2011) analysis. Subsequently, we will argue in favor of a NumP, which will contribute to a better understanding of the source of the ordering interpretation and the structure of the two readings of the *di* ordinal phrase.

4.1 DP Analysis

The presence of articles in languages has been a subject of debate in linguistic literature. Bošković (2008, 2012) and Jiang (2012, 2020) argue that languages without articles lack a DP structure. As for Cheng and Sybesma (1999, 2012), they propose an alternative analysis, challenging the notion of an empty D and suggesting that classifiers can fulfill the functions associated with determiners. Additionally, Sybesma and Sio (2008) highlight that Cheng and Sybesma's analysis primarily focuses on the distribution and interpretational variability of bare nouns and [Cl + N] phrases, while failing to account for elements appearing to the left of classifiers, such as demonstratives in [dem + Num + Cl + N] phrases. Consequently, neither an NP analysis nor Cheng and Sybesma's (1999) NumeralP analysis for indefinites in Mandarin can fully explain the properties of *di* ordinal phrases.

In light of these considerations, we assume that the element *di* is a D-element because *di* ordinal is closely related to definiteness, as shown in (3) (repeated as (26)).

(26) Zhangsan   mai-le   di   san-dong   fangzi.
       Zhangsan   buy-ASP   di   three-CL   house
       a.   'Zhangsan bought a house, which is the third in a row.'
       [definite]
       b.   'Zhangsan already had two houses, and he bought another one.'
       [indefinite]

In essence, the element *di* serves multiple functions at the same time, denoting an ordering construal and acting as a D-element. This versatility is not uncommon among D-elements, as seen in examples like *le* in French, which can function as both a determiner and a gender classifier.[4]

Second, in Cheng et al. (2017) footnote 4, they define DP on semantic grounds and consider DP as a projection that can be converted to semantic type <e> or <<et>t>. Cheng et al. (2017) also argue that it is unclear whether a language could 'lack' the category of DP. Since *di* ordinals are arguments and can occur freely in subject or object positions, it is reasonable to assume that *di* ordinals project a DP projection.

Third, the D-element has the function of individualizing or singularizing by specifying a single instance of what is described by the NP (see Longobardi 1994; Cheng and Sybesma 1999). In the case of the morpheme *di*, it presupposes an ordering operation and selects a single entity associated with a numerically-valued position in the ordering

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[4] We express our gratitude to an anonymous reviewer for prompting us to clarify this aspect. The reviewer provides an alternative configuration in (i), where D is empty with underspecified features for definiteness and *di* may either has its own projection or attach to its following number.

(i) D[Ø, underspecified for (in)definiteness] + *di* + Num

     The reviewer argues that in (i) *di* itself is the source of the ordinal semantics and is separated from D, which is a different concept/category in syntax and semantics.

     We agree with the reviewer that *di* itself is the source of the ordinal reading, but we fail to discern any advantages in segregating the ordinal reading from D. The diverse nature is not unusual among D-elements, as demonstrated by instances such as *le* in French, which can fulfill roles as both a determiner and a gender classifier.

     In addition, an empty D is just like any other empty category in that it must be lexically governed. It is not clear how an empty D with underspecified features for definiteness can be licensed and supported by cross-linguistic evidence.

sequence. As a result, Mandarin ordinals cannot co-occur with adverbs like *zhengzheng* 'in total' (see Zhang 2019).

(27) *Zhangsan   zhengzheng   mai-le   di san-dong   fangzi.
      Zhangsan   in total   buy-ASP   di three-CL   house

Fourth, *di* ordinals are deictic expressions that are sensitive to variations in the context of utterance. For example, the reference of *di san-dong fangzi* 'the third house' depends on the reference point or perspective of the speaker, allowing for the ordering of houses from right to left or left to right. Barbiers (2007) further highlights the subjective nature of ordinality compared to the objective nature of cardinality. Ordinality relies on the point of view of the speaker, which is expressed through an experiencer PP, as exemplified in (28) in Dutch.

(from Barbiers 2007)
(28) a. *Dit   zijn   (*voor mij)   vijf   boeken   die   ik
       these   are   for me   five   books   that   I
       vandaag   heb   gelezen.
       today   have read

   b. Dit   is   (voor mij)   het vijfde boek dat   ik
       This   is   for me   the fifth book   that   I
       vandaag   heb   gelezen.
       today   have read

Furthermore, the morpheme *di* follows the inconsistency test of [X boy is tall and X boy is not tall] (see Löbner 1985, Robinson 2005). In English, when X is a demonstrative, the sentence does not lead to a contradiction (e.g., *That boy is tall and that boy is not tall*). However, if X is *the*, the sentence becomes contradictory. In Mandarin Chinese, if X is the demonstrative *zhe*, the sentence does not necessarily result in a contradiction, as shown in (29a). However, when X is *di*, a necessary contradiction emerges, as shown in (29b).

(29) a. Zhe   yi-ge   xuesheng shi   nansheng,
        DEM   one-CL   student   is   boy
        zhe   yi-ge xuesheng bu   shi   nansheng.
        DEM   one-CL   student   not is   boy
        'This student is a boy; this student is not a boy.'
    b. *Di   san-ge   xuesheng   shi   nansheng,
        di   three-CL student   is   boy
        di   san-ge   xuesheng bu   shi   nansheng.
        di   three-CL   student   not is   boy
        '*The third student is a boy; the third student is not a boy.'

In light of these findings, we have established that the element *di* occupies a D position. The subsequent section will examine H.-C. Tsai's (2011) analysis of *di* and illustrate its limitations in fully explaining the behavior and distribution of *di* ordinals due to recently discovered empirical data.

4.2 Review H.-C. Tsai (2011)

H.-C. Tsai (2011) argues that the dual interpretation of ordinal expressions is attributed to the lexical ambiguity of the morpheme *di*, which functions as a determiner and heads a DP. According to H.-C. Tsai, if *di* is a [+strong] determiner, a definite reading is obtained. Conversely, if *di* is a [-strong] determiner, a quantity reading is derived. She posits that the number of events involved significantly influences the interpretation of ordinals. For example, if the event described in the sentence occurs once, only a definite unique reading is possible. On the other hand, if the event occurs multiple times, an indefinite quantity reading is triggered. Tsai outlines the conditions that determine the strength of the morpheme *di* in (30).[5]

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[5] One of the reviewers suggests that our current analysis extends and reinforces Tsai's (2011) work. The interplay between our proposed analysis and Tsai's (2011) event-oriented approach presents a nuanced dynamic. We agree with the reviewer's assessment and recognize that a comprehensive examination of *di* ordinals necessitates the incorporation of events. Indeed, *di* ordinals, numeral expressions, and frequency

(30) a. *Di* is a [+strong] determiner if:
- the sentence's event is realized only once;
- the context of the sentence provides an ordered set of objects which are contiguous within a single spatial location (e.g. three houses which stand in a row along Main Street in Vancouver);
- the context of the sentence provides a presupposed referential denotation for the ordinal phrase.

  b. *Di* is a [-strong] determiner with an additive function if:
- the sentence's event is carried out more than once;
- there is no contextually-provided ordered set, or the objects in the ordered set are not contiguous within a single spatial location (e.g. three houses which do not stand in a row: one is in Vancouver, one is in Philadelphia, and one is in Paris.);
- the context of the sentence is not sufficient to verify a presupposed referential denotation for the ordinal phrase.

  c. *Di* is ambiguous between a [-strong] and a [-strong] determiner for other contexts.

Let's consider ordinal phrases with the verbal aspect marker *-le* in (3), repeated as (31), as an example and examine how H.-C. Tsai (2011) discusses the interpretations of ordinal phrases in relation to the conditions in (30).

(31) Zhangsan   mai-le   di   san-dong   fangzi.
      Zhangsan   buy-ASP   di   three-CL   house
      a. 'Zhangsan bought a house, which is the third in a row.' [definite]
      b. 'Zhangsan already had two houses, and he bought another one.' [indefinite]

Simply put, in (31a), the situation of "Zhangsan bought the third house in a row" fulfills the requirement of the verbal aspect marker *-le* since a house-buying event has been realized (see Lin 2003). The existence of a

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expressions can be construed as predicates at the kind level pertaining to events, as discussed in depth in Zhang (2022).

presupposed referent for *di san-dong fangzi* can be verified by the context, and since a house-buying event has occurred once, *di* in this case functions as a [+strong] determiner, resulting in a definite reading. It should be noted that (31) does not exclude the possibility that Zhangsan has bought two houses before, either at different times or simultaneously. When Zhangsan carries out another house-buying event, the house acquired in this event is added to the two houses he previously bought, thus making it count as "a third one." In this situation, the context of the sentence does not provide specific details about an ordered set of houses in a single space, making it impossible to verify the existence of a presupposed referential denotation for *di san-dong fangzi*. Hence, an indefinite quantity reading is obtained in (31b).

Contra H.-C. Tsai's (2019, 2011) observation, example (32) is provided to argue that the number of events does not exclusively determine the interpretation or function of *di* ordinals. In (32) an event occurs only once, and ambiguity can arise instead of the definite reading postulated by H.-C. Tsai (2019, 2011). Specifically, it may denote a scenario where a sequence of wine glasses is present, and Zhangsan has consumed the initial glass in this sequence, resulting in a definite reading. Conversely, a more predominant interpretation suggests that Zhangsan has consumed "a very first glass of wine," with the specific ordering of the glass in question being of minimal relevance within the current contextual framework.

(32) Zhangsan he   di yi-bei   jiu   jiu zu le.
     Zhangsan drink   di one-CL wine   then drunk SFP
     a. 'Zhangsan got drunk from the first glass of wine in a row.'
     [definite]
     b. 'Zhangsan got drunk from a first glass of wine.'
     [indefinite]

In addition, H.-C. Tsai's (2011) analysis faces a challenge posed by sentence (33), which is interpreted as conveying an indefinite quantity reading. This interpretation arises from the fact that Zhangsan's album has not been released at the time of utterance, leading to an absence of

presupposition regarding its existence. Consequently, a unique definite reading is not applicable within this context.

(33) Zhangsan   ming   nian   hui fabiao   di
      Zhangsan   next   year   will release   di
      yi-zhang zhuanji.
      one-CL   album
      'Zhangsan will release a first album next year.'   [indefinite]

Furthermore, H.-C. Tsai's (2011) claim regarding the dual nature of a determiner, characterized as both [+strong] and [-strong], lacks empirical substantiation. To eliminate redundancy and emphasize the principle of economical representation, we adopt the assumption that *di* is underspecified for definiteness. This perspective aligns with the insights provided by Halle and Marantz (1993), which underscore the phenomenon of underspecification within grammar, manifesting in both lexical and functional domains.

4.3 *Di*: Underspecified for Definiteness

There are divergences in expressing the notion of definiteness, as different languages may use different lexical items with different features to encode the same meaning. For instance, in Russian, Ramchand and Svenonius (2008) argue that the D head is underspecified for features like (in)definiteness and (un)specificity whose value is determined by context. In Chinese DP, Simpson (2002) argues that the modificational element *de*, found in relative clauses, possessor structures and nominalizations, should be analyzed as a neutral general determiner that is fully underspecified for definiteness.

Now let's focus on the morpheme *di* in the ordinal phrase [*di* + Num + Cl + N] and the licensing of the two readings, which relies on the verification of a presupposed referential denotation for the ordinal phrase. We assume that the *di* ordinal phrase is interpreted as definite when certain semantic components, such as presupposition of existence, uniqueness, and familiarity, are licensed (see Heim 1982, 1991). In other words, the definite reading of *di* ordinals suggests that both the speaker and the

addressee are aware of the referent of the ordinal phrases, and the existence of the referred entity has been established in the discourse. On the contrary, the *di* ordinal phrase gives rise to indefinite quantity readings if it is subject to the novelty condition and may denote an entity that has not been explicitly introduced into the discourse context (Enç 1991). According to Christophersen's (1939) view, indefinite descriptions indicate that the addressee of the utterance is not presumed to be acquainted with the referent of the noun phrases.

Considering this analysis of the morpheme *di*, we can now explain how the two readings of *di* ordinals are derived. When there is a presupposition that the referent is unique in the domain of discourse, where uniqueness can be established through previous mention or world knowledge, the *di* ordinal phrase is interpreted as definite. For instance, (31) with the verbal aspect marker *-le* denoting a "realization aspect," it may describe a situation where the hearer is in front of the house being discussed at that moment, or the speaker and hearer may be standing together looking at the house. The physical situation in which the speaker and hearer are located contributes to the presupposition of existence and familiarity of the referent of the ordinal phrase *di san-dong fangzi*, and thus we obtain the reading that Zhangsan realizes the event of buying "the third house." Another possible situation is that the speaker knew that Zhangsan already owned two houses, and he or she knew that Zhangsan bought another one, but the location was not relevant to the conversation. The event of Zhangsan's buying a third house satisfies the requirement of the verbal aspect marker *-le*. Since the listener or maybe the speaker is not familiar with the location of *di san-dong fangzi* 'a third house', an indefinite quantity reading is derived.[6]

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[6] One of the anonymous reviewers highlights that in sentence (i), both the speaker and the addressee are aware of the referent of the ordinal phrases, and the existence of the referred entity has been established within the discourse. Nonetheless, an indefinite reading persists. On the basis of our intuition and the intuitions of our informants, it is evident (i) is ambiguous, allowing for both a definite and an indefinite reading.

(i) Yan-qian de zhe   wu-wan   fan,   Zhangsan   yijing   chi-le
     eye-front DE this five-bowl   rice   Zhangsan   already   eat-ASP
     di san-wan   fan,   jijiang   mairu   di   si-wan.
     di three-bowl   rice, soon   move   di   four-bowl.

Similarly, sentence (11) (repeated as (34)), with the aspect marker -*guo*, refers to a situation where there is a list of books on the shelf, and the third one in order, known by the speaker and addressee, was read by Zhangsan. The event of reading this 'third book in a row' is allowed to be repeated and patterns with properties of -*guo*.

(34) Zhangsan   du-guo   di   san-ben   shu. [definite]
     Zhangsan   read-ASP   di   three-CL   book
     a. 'Zhangsan had the experience of reading the third book.'
     b. #'Zhangsan had the experience of reading a third book.'

Importantly, it is implausible to conduct and repeat the book-reading event in a case where the existence of the referred entity has not been established in the discourse. This lack of an indefinite quantity reading is thus borne out.

When we consider the contrast between abstract massifiers like *bang* 'pound' in (35) and concrete classifiers like *dai* 'bag' in (36), along with the aspect marker of verbal -*le*, it becomes clear how the presupposition of existence determines the interpretations of ordinal phrases.

'Among the five bowls of rice in front of him, Zhangsan has already finished eating a third bowl and is about to move on to a fourth.'[indefinite]
'Among the five bowls of rice in front of him, Zhangsan has already finished eating the third bowl and is about to move on to the fourth.'[definite]

(In a rice-eating context)

In a situation where there is a row of bowls, with both the speaker and the addressee present, consider the scenario where Zhangsan has finished eating the third bowl of rice in sequential order, and he is now about to eat the fourth bowl in the same order. This context naturally lends itself to a definite reading. However, it is also plausible that under the context where there are a total of five bowls of rice, Zhangsan finished eating three bowls and was planning to eat a fourth one. In this scenario, two bowls of rice remain, and neither the speaker nor the addressee knows which of the two bowls will be consumed next. In such circumstances, an indefinite reading is derived.

(from H.-C. Tsai 2009, 2011)

(35) Zhangsan chi-le di san-bang yingtao. [indefinite]
    Zhangsan eat-ASP di three-pound cherry
    'Zhangsan ate a third pound of cherries.'

(36) Zhangsan chi-le di san-dai yingtao.
    Zhangsan eat-ASP di three-bag cherry
    a. 'Zhangsan ate the third bag of cherries.' [definite]
    b. 'Zhangsan ate a third bag of cherries.' [indefinite]

As discussed in (31), an ordinal expression in sentences with the verbal aspect marker *-le* can be ambiguous, allowing for both a definite unique reading and an indefinite quantity reading. However, in (35), an ordinal phrase only lends itself to an indefinite quantity reading. A definite reading is not acceptable in (35) because measure words are abstract and lack concrete forms or shapes. For instance, there is no reference for "a third pound," and therefore no presupposed referential existence is provided for the ordinal phrase *di san-bang yingtao* 'a third pound of cherries'. In this sense, we can only derive an indefinite quantity reading. It is important to note that a definite reading can emerge if an abstract measure word like *bang* 'pound' is replaced with a concrete classifier like *dai* 'bag', as shown in (36).

Regarding ordinals in subject position, the default reading is definite, unless the morpheme *you* 'have/exist' is added, as demonstrated by the contrast below:

(from H.-C. Tsai 2009, 2011)

(37) Di san-ge xuesheng tongguo-le ruxue kaoshi.
    di three-CL student pass-ASP entrance exam
    'The third student passed the entrance exam.' [definite]

(38) You di san-ge xuesheng tongguo-le ruxue kaoshi.
    have di three-CL student pass-ASP entrance exam
    'There is a third student who has passed the entrance exam.' [indefinite]

It has been established in the literature that subject positions in Mandarin Chinese only allow specific NPs, and indefinite nominal expressions are generally disallowed as subjects unless otherwise licensed (e.g., Lee 1986; Shyu 1995; Li 1998; Tsai 2001, among others). Accordingly, for the ordinal phrase *di san-ge xuesheng* to appear in subject position, it must require an identifiable presupposed referent, resulting in a definite reading.[7]

However, there is a complication when it comes to ordinal phrases in subject position. If the morpheme *you* 'have/exist' is inserted, ordinal expressions in subject position turn out to assume an indefinite quantity reading. Existential sentences, as pointed out by Huang (1990), do not allow definite noun phrases. Since the speakers and addressees are not assumed to know who or what is being talked about or referred to, the *di* ordinal phrase in (38) exhibits an indefinite quantity interpretation.

One of the reviewers suggests that (39) with *di* ordinals in subject position, assuming an indefinite reading, could be a counterexample.

(39) Di   san-ge   houxuanren   lai-le.   [indefinite]
     di   three-CL   candidate   come-ASP
     'A third candidate came.'

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[7] One of the anonymous reviewers claims that (i) challenges the commonly held presumption that the subject position invariably conveys a definite reading. In (i), a modifier *yingguo shi shang* 'England history on,' is followed by *di* ordinals, serving the function of introducing an alternative set of women while excluding a third woman from the context of English history (see Rooth 1992). Specifically, it presupposes the existence of 'a third woman in American history' or 'a third woman in Dutch history,' and (i) can be preceded by (ii):

(i)   Yingguo   shi   shang   di   san-wei   nuxing   huode
      England   history   on   di   three-CL   female   obtain
      shouxiang   zhiwu.
      premier   position
      'In British history, a third woman holds the position of Prime Minister.'
(ii) Bu   shi   Meiguo   shi   shang.
      Not   is   American   history   on
      'Not in American history.'

It is important to note that the modifier does not inherently license semantic components such as presupposition of existence, uniqueness, or familiarity. Consequently, (i) leads to an indefinite quantity reading.

In fact, sentences involving verbs like *lai* 'come' in (39), *chuxian* 'show' in (40a) which have to do with "coming into existence," or verbs like *si* 'die' in (40b) and *pao* 'escape' in (40c) which have to do with "going out of existence" could be analyzed as existential sentences (see Huang 1987, 1991).

(40) a. Di   san-ge   houxuanren   chuxian-le. [indefinite]
          di   three-CL candidate   show up-ASP
          'A third candidate showed up.'
      b. Di   san-ge   houxuanren   si-le.
          di   three-CL candidate   die-ASP
          'A third candidate died.'
      c. Di   san-ge   fanren   pao-le.
          di   three-CL prisoner   escape-ASP
          'A third prisoner escaped.'

The phenomenon of underspecified definiteness marking is not unique to Mandarin, and a similar linguistic characteristic can be observed in Russian. Consider the examples presented by Apresjan (1995:258), as cited by Cho and Slabakova (2014):

(41) Za   dverju slyšalsja ženskij golos.
      behind   door   heard   woman-ADJ.NOM [voice-ADJ.NOM]
      'A woman's voice was heard behind the door.'

(42) Za   dverju slyšalsja golos ženščiny
      behind   door   heard   woman-NOUN.GEN [voice-Noun.GEN]
      'The voice of a/the woman was heard behind the door.'

The possessor in Russian exhibits the ability to convey both definite and indefinite readings, which is contingent upon the morphological form of the possessor-modifier employed. For instance, in (41), adjectival possessor-modifiers (e.g., *ženskij* 'woman-ADJ') are interpreted as indefinite, referring to any woman in general. As for the postnominal genitive case-marked noun modifier (e.g., *ženščiny* 'woman-NOUN-

GEN') in (42), it exhibits underspecification for definiteness, resulting in an ambiguous interpretation of the referent as either an indefinite woman or a specific woman who is already known. Cho and Slabakova (2014) propose that the underspecified [definite] reading of nominal possessors can be disambiguated through contextual cues.

Summarizing the discussion, we propose that the morpheme *di* should be underspecified for definiteness, and the two readings of *di* ordinals can be accounted for by considering semantic components such as the presupposition of existence, uniqueness, familiarity, and the novelty condition. This analysis significantly contributes to our understanding of how interpretations of ordinals are influenced by their distribution, aspectual markers, predicate types, and massifiers. Importantly, a similar underspecified phenomenon is observed in Russian. In the following section, we discuss the structure of number expressions and elucidate the sources of the ordering interpretation associated with *di* ordinals.

4.4 *Di*: Numeral Projection

Among recent works on the structure of indefinite cardinal readings of noun phrases, there have been proposals that assume a numeral is hosted by a Numeral Phrase (NumP) (see Cheng and Sybesma 1999; Li 1999; Huang 2015; Huang et al. 2009; Zhang 2019). Zhang (2019) specifically claims that a numeral is in [Spec, NumP], while a classifier heads a Classifier Phrase in Mandarin Chinese. In most languages, ordinal numerals are derived productively from cardinal numbers using affixes. The position of the ordinal numeral relative to the head noun often coincides with that of the cardinal numeral. The internal structure of ordinals, similar to cardinals, can be built up in syntax through multiplicative and additive structures (see Hurford 1987; He 2015; Her and Tsai 2020). In addition, Mandarin cardinals and ordinals are in complementary distribution, as shown in (43).

(43) *di   yi   san   ben shu
      di   one three   CL book
      Intended: 'the first three books'

On the basis of these observations, we assume that ordinals remain in the projection of the Numeral Phrase between a Determiner Phrase (DP) and a Classifier Phrase (CLP). An important question that arises in this context is how to distinguish between cardinal and ordinal readings in Mandarin Chinese. We propose that this distinction is achieved through an operator in a Num head, following the semantics of numerals discussed in Zabbal (2006) and Scontras (2013). Specifically, cardinal numerals are formed by the CARD operator, while ordinal numerals are derived from the ORD operator, as shown in (44).

(44) [$_{DP}$ [$_{D'}$[$_{NumP}$ [$_{Num'}$ CARD/ORD OP [[$_{ClP}$ [$_{CL'}$[$_{NP}$ [$_{N'}$]]]]]]]]]

The choice of operators in Num determines the function of the numerals. Building on Krifka (1989), the denotation of the cardinal operator CARD is a two-place relation of type <et,<n,et>> that takes a predicate and returns a relation between numbers and individuals in (45).

(45) Cardinal Semantics
      [[CARD]] = λPλnλx. P(x) ∧ |x| = n

It is worthwhile to note that ordinals carry an additional meaning that cardinals lack, namely, ordinal expressions presuppose the existence of an ordering. The denotation of the ordinal operator -TH is a two-place relation of type <et,<n,et>> that takes a predicate and returns a relation between numbers and individuals (Zabbal 2005).

(46) Ordinal Semantics
      Presupposition: there is at least one ordering function f: P → In, for some n∈N, with induced partial order ≤p on P.
      [[-TH]] = λP.λn.λx. ∃f [f(x) = n]   (from Zabbal 2005:44 (70))

Following this framework, it is expected that numeral phrases in the form [Num + N], such as *san nu* in (47), can convey both cardinal and ordinal readings depending on the context. For example, *san nu* can

signify 'three daughters' in (47a) and 'third daughter' in (47b).[8, 9]

(47) a. Zhangsan   you san   nu   yi   nan.
          Zhangsan   has three   daughter one son
          'Zhangsan has three daughters and one son.'
     b. Zhangsan   zui   tengai   san nuer.
          Zhangsan   most   dote on   third daughter
          'Zhangsan dotes on his third daughter most.'

Another relevant aspect pertains to the phrasal nature of numerals in [Spec, NumP], regardless of whether they are cardinal or ordinal. Unlike certain head elements such as verbs, numeral expressions are phrasal and do not allow ellipses, as shown in (48).

(48) a. Zhangsan   you san   nu,   Lisi you wu
          Zhangsan   has three   daughter Lisi has five
          *(nu).
          daughter
          Intended: 'Zhangsan has three daughters, and Lisi has five.'

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[8] One reviewer raises concerns regarding the naturalness of [Num N] constructions in Mandarin Chinese when interpreting them as cardinal or ordinal. First, the reviewer suggests that cardinal NPs often require the presence of a classifier. It is important to note that the pattern [Num N] with a cardinal reading has been discussed by Wang (2015), Chu and Liu (2015), and Her (2012a, 2012b). Her (2012a, 2012b) highlights that in Beijing Mandarin, classifiers can be more freely omitted compared to Taiwan Mandarin. For instance, examples such as *juan liang qiguan* 'donate two organs' and *bankua guo san gongsi* 'ran and bankrupted three companies' have been observed in the movie 非誠勿擾 Fei Cheng Wu Rao (If You are the One) and its sequel.

Second, the reviewer mentions that [Num N] constructions with ordinal interpretations are not very productive and are primarily limited to kinship terms. However, there are instances of [Num N] with an ordinal reading in Mandarin, as demonstrated by examples like *san lou* 'third floor,' *san chang* 'third factory building,' and *san shitang* 'third dining hall,' as discussed in Wang (2015). Therefore, while the *di*-less ordinal usage may not be highly productive, it can still be found in various contexts.

[9] The reviewer suggests that adding *yi nan* 'one son' after (47a) and replacing *nu* 'daughter' with *nuer* 'daughter' would make the sentences sound better. We appreciate the reviewer's feedback and have revised the sentence accordingly.

b. Zhangsan   zui   tengai   san nuer,
     Zhangsan   most   dote on   third daughter
     Lisi   zui   tengai   er   *(nuer).
     Lisi   most   dote on   second   daughter
     'Zhangsan dotes on his third daughter most while Lisi dotes on his second daughter most.'

The above discussion on Mandarin Chinese cardinals and ordinals suggests that numerals occupy the [Spec, NumP] position. The interpretations of numeral expressions are determined by an operator in the Num head. In conclusion, for *di* ordinals, the ordering reading arises from both *di* and an ORD operator in a Num head.

For *di*-less ordinals in the form of [Num N], the ordering reading comes solely from an ORD operator.

5. CONCLUSION

This paper aims to account for the ambiguity present in the *di* ordinal phrase [*di* + Num + Cl + N] in Mandarin Chinese. We have demonstrated that Barbiers' (2007) feature classification system for numerals cannot be adopted in Mandarin Chinese. Furthermore, a unified account of ordinals and superlatives falls short in explaining the properties of *di* ordinal phrases. Instead, we propose that a nominal framework should be employed to analyze *di* ordinal phrases. This analysis raises the question of whether languages such as Mandarin Chinese, which lack overt articles, should incorporate a DP projection. Through our examination of the morpheme *di*, we propose that it functions as a D-element with underspecified definiteness features. Therefore, studying *di* ordinals provides valuable insights into the nature of nominal expressions in Mandarin Chinese.

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Hui-Chin Tsai
Department of Foreign Languages and Literature
Feng Chia University
Taichung, Taiwan 407, ROC

Department of English
National Taiwan Normal University
Taipei, Taiwan 106, ROC
iamjoycetsai@gmail.com

漢語序數結構與 DP 結構投射

蔡慧瑾
逢甲大學
國立臺灣師範大學

本文探討漢語序數結構「第+數詞+量詞+名詞」（簡稱為「第序數」）。首先，我們指出 Barbiers 將數字分類的特徵分析（feature analysis）不適用於漢語，因為漢語的「第序數」是規則的，不存在像 FIRST 這樣的不規則情形。此外，我們認為 Bhatt and Pancheva 將序數結構分析為最高級的論點無法解釋漢語的「第序數」。漢語的「第序數」(「第+數詞+量詞+名詞」)內含量詞，因此我們捨棄形容詞最高級分析，改採名詞結構分析，假設表序數語意的詞素「第」為定語成分（D-element），其定指性（definiteness）不明，需要根據句法與語意來確定。我們的分析不僅能解釋「第序數」的歧義，還對 H.-C. Tsai（2011）的分析進行了改良。

關鍵字：序數結構、定指、數量、定語結構、特徵分析、未指明分析