The theory of argument formation—A view from Mandarin and Yi[*]

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1   Introduction

This paper is about the relation between the existence of overt article determiners (of category D), distinct from other members of the determiner family like *that* or *this*, in a language and whether or not such a language allows bare arguments. This is a topic that has been widely investigated in number marking languages (NMLs in short), that is, languages with morphological exponents of grammatical number. For example, in English, whether or not we are talking about *one book* or *many* will determine the form of the noun we use: *book* vs. *books*. Additionally, numerals in NMLs combine directly with nouns: *one book* vs. *two books*. NMLs split on whether they possess overt Ds. While languages like English, Italian, and French do have overt Ds, languages like Russian and Hindi do not. A robust generalization about these two types of NMLs is that in all NMLs with overt Ds, there are always restrictions on the occurrence of bare arguments. For instance, in English, bare singular count nouns are disallowed in argument position; in Italian bare singular count nouns are disallowed everywhere, but bare plural/mass nouns are disallowed in certain position (e.g. Longobardi 1994); in French, bare arguments (bare singular/plural/mass nouns) are disallowed. In contrast, in NMLs without overt Ds, there is no such restriction: Russian and Hindi freely allow all kinds of nouns to occur bare in every argumental position, though of course the position may restrict the interpretation of bare nouns in systematic ways (cf, in particular, Dayal 2004)).

In contrast with this, classifier languages (ClLs in short) like Mandarin and most other East Asian languages do not express grammatical number, and more importantly, do not allow numerals to combine directly with nouns. In these languages, a classifier is required to connect a noun with a numeral regardless of whether the noun is conceptually count or mass. Now, there is a widespread belief that ClLs lack overt article determiners although they do have specialized structures to express (in)definiteness (Cheng & Sybesma 1999, 2005, Simpson 2005, a.o.). There is no doubt that this is a strong tendency. Chierchia (1998) proposes a theoretical account of this tendency based on the idea that nouns in ClLs are kind-referring (i.e. entities, cf. also the classic Carlson 1977). Being of type e, nouns can occur directly as arguments of verbs, and hence there is never a need for determiners to develop in their grammars. In this paper, we will introduce a Sino-Tibetan language, Yi, and show that Yi is a ClL with an overt article determiner and allows bare nouns to freely occur in every argumental position. The new data from Yi will show that the above empirical claim about ClLs is wrong, and that therefore Chierchia's theoretical stance needs to be reexamined.

The heart of these issues is how nouns become arguments, which is the object of an intense debate. Broadly speaking, there are two main camps. Some authors claim that nouns have fixed denotations across languages (namely, properties) and must co-occur with an article determiner in order to serve as an argument (e.g. Longobardi 1994 et seq; Borer 2005). Whenever no overt D is to be seen, a covert one is to be assumed. According to this view, the category D is always universally projected. Other authors

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maintain that D projection is subject to parameterization (e.g. Chierchia 1998; Dayal 2004; Bošković 2005 et seq). Whether D is syntactically projected or not depends on one of two things: the availability of a semantic operation that turns nouns of the property-type into arguments, subject to some kind of blocking (e.g. Dayal 2004), and the possibility that nouns may be argumental/kind referring (e.g. Chierchia 1998). We hope the new data from Yi to be discussed in the present paper shed some light on this ongoing debate. In particular, the discovery of a ClL with an overt lexical article determiner may seem to tilt the balance in favor of the universal DP hypothesis and also conclusively disprove Chierchia's hypothesis that nouns in ClLs are inherently argumental. But we will actually wind up arguing, perhaps, surprisingly that the opposite is the case.

The paper is organized as follows. Section 2 compares Mandarin with Yi in the nominal domain. The comparison between these two ClLs raises a series of general puzzles concerning ways of marking definiteness, behaviors of demonstratives, and the status of D. Section 3 examines the behavior of Numeral Constructions (NCs for short, of the form *two boys* or *liang ge ren* 'two Cl man') at the clausal level. We will show that their syntactic distribution and semantic interpretations display a formidable uniformity across languages, regardless of whether a language is a number marking one or a classifier one and whether or not it has an overt D. This uniform behavior of NCs across languages will turn out to provide us with a good starting point to understand nominal arguments in Mandarin and Yi. In this section, we develop a general lexical approach to numerals that provides a basis for a unified approach to NCs for both NMLs and ClLs. Section 4, which is central to the analytical contribution of this paper, analyzes the internal structure of NCs. It will be shown that NCs in ClLs are rather different from those in NMLs in the internal domain, even though their external behaviors at the clause level are so similar. We will argue that with a fairly small modification of Chierchia's (1998) framework of ClLs, not only can we accommodate facts from Yi in a principled manner, but also we can make a couple of interesting predictions about ClLs. We further show that the proposed analysis derives the similarities and differences between Mandarin and Yi in a parametric manner. Section 5 lays out consequences that follow from our analysis of nominal arguments concerning the marking of definiteness via bare nouns and demonstratives in ClLs and further discusses other ways of expressing definiteness in ClLs like Cantonese and Bangla. In the end of Section 5, we discuss the predictions that our analysis makes about other types of ClLs and point out directions for typological investigation in the future. Section 6 summarizes and concludes.

2   Nominal arguments in ClLs: similarities and differences between Mandarin and Yi

This section is dedicated to a comparison between Mandarin and Yi in the nominal domain. Their similarities and differences will be addressed in turn.

2.1   Similarities between Mandarin and Yi

Mandarin is superficially similar to Russian and Hindi in that it freely allows bare arguments and does not have any overt evidence of article determiners. This type of ClLs has been widely discussed in the literature (see Tang 1990; Li 1997, 1998, 1999; Cheng and Sybesma 1999; Simpson 2005; Zhang 2013 a.o.). Yi is the seventh largest of the 55

ethnic minority groups in China, with 7.76 million populations (according to 2000 census of China). The standard as well as the best preserved Yi language is its northern branch, which is referred to as *Nuosu Yi*. Nuosu Yi is spoken in the southern Sichuan and the northern Yunnan in China. The data presented in this paper is from Nuosu Yi.[1] For simplification purposes, we refer to Nuosu Yi as Yi throughout this paper.

Yi belongs to Tibeto-Berman languages within the Sino-Tibetan family; it is a *head final* language with SOV word order (Hu 2002; Walters 2010). Similarly to Mandarin, Yi is a classifier language. Without a classifier, a numeral cannot directly combine with a noun (1a) and (2a). Mandarin NCs consist of a numeral (Num), a classifier and a noun in the order [Num-Cl-N] (1b); Yi NCs also consist of a Num, a classifier and a noun but in a different order [N-Num-Cl] (2b).[2]

(1)   a. * *san   xuesheng*   b. *san   ge xuesheng*   (Mandarin)
              three   student   three Cl student
                                                          'three students'

(2)   a. * *mu   sɔ*   b. *mu   sɔ   ma*   (Yi)
              horse   three   horse   three   Cl
                                                          'three horses'

The nouns in (1) and (2), i.e. *xuesheng* 'student' and *mu* 'horse', are conceptually count. The two classifiers *ge* and *ma* do not create a unit of measure for the nouns; instead, they simply name the units in which the entities denoted by the nouns naturally occur (e.g. see Cheng and Sybesma 1999: 515). We refer to the classifiers which do not create a unit for the nouns but simply name the standard unit coming with the nouns as 'individual classifiers'. Besides individual classifiers, there are four more main types of classifiers: (i) container classifiers (eg. 'bowl'), (ii) standard measure classifiers (e.g. 'pound'), (iii) group classifiers (e.g. 'group/team'), and (iv) partitive classifiers '(e.g. 'layer').[3]

The second similarity between Mandarin and Yi concerns their NCs. They share three properties, which as we will see are stable properties of NCs across languages. These three properties are given in (3).

(3)   Three properties of NCs in Mandarin and Yi
        (i)   Property 1: They have predicative use
        (ii)   Property 2: They can be used as restrictors of demonstratives and
                quantifiers.
        (iii)   Property 3: They are construed as indefinites in argument position
We will elaborate on them in turn. The first property is exemplified in (4).

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[1] Most data from Nuosu Yi in this paper were collected from our collaborative work with a native Nuosu Yi speaker from Fall 2009 to Fall 2014. Data from the literature will be duly noted.
[2] There are some exceptions to this generalization. For example, in both languages, some disyllabic cardinals like 'fifty' (*ŋu-tshi* in Yi and *wu-shi* in Mandarin) can directly combine with a noun without the presence of a classifier. This phenomenon in Mandarin can regarded as a residue from Old Chinese. According to our Yi informant, the phenomenon in Yi might be a residue from Old Yi as well. We will leave for future research the question of why certain disyllabic cardinals can allow optional classifiers.
[3] Notice that the last four types of classifiers are available across languages; only the first type of classifiers—the individual classifiers are unique to ClLs. See Chao (1968) for details on all types of classifiers in Mandarin.

(4) a. *Zhangsan, Lisi, Wangwu shi <u>san   ge xuesheng</u>.*   (Mandarin)
        Zhangsan, Lisi, Wangwu be three Cl student
        'Zhangsan, Lisi and Wangwu are three students.'
     b. *Aka sini Ako <u>sse-vo nyip   ma ŋu</u>.*   (Yi)
        Aka and Ako boy   two   Cl be
        'Aka and Ako are two boys.'

The predicative use of NCs (in which they are presumably construed as being of a predicative semantic type, say <e, t>) is also probably at the basis of their capacity to serve as the restrictors of demonstratives (Dem) and quantifiers, as exemplified in (5).

(5) a. <u>*zhe/na*</u>   *wu ge nv-sheng*   a′. <u>*mei*</u>   *liang ge xuesheng*   (Mandarin)
        this/that five Cl girl   every/each two   Cl student
        'those five girls'   'every two students'
     b. *mu   <u>tshɿ/a daɿ</u> sɔ   ma*   b′. *ssox sse cyp ma <u>dzi³ a²¹dzi</u>*   (Yi)
        horse   this/that   three Cl   student one Cl every
        'these/those three horses.'   'every student'

In addition to their predicative use, Mandarin and Yi NCs can also appear in argument position with an indefinite interpretation. They receive a narrow scope existential reading in (6a) and (6b) and can appear in existential sentences, as in (6a′) and (6b′).

(6) a. *wo mai le <u>san   zhang   zhuozi</u>*   (Mandarin)
        I   buy Asp three Cl   desk
        'I bought three desks.'
     a′. *fangjian li   you <u>liang ge ren</u>*
        room   inside have two   Cl man
        'There are two men in the room.'
     b. *nga <u>zhuop-zyr sɔ   ma</u> vy lo.*   (Yi)
        I   desk   three Cl bought
        'I bought three desks.'
     b′. <u>*mu   sɔ   ma*</u> *a-di dʐu*
        Horse three Cl there have
        'There are three horses'

The third similarity between Mandarin and Yi is that they both allow bare arguments. In particular, Mandarin bare nouns receive a kind reading when occurring with a kind level predicate (Krifka 1995) (7i); they receive a generic reading in generic sentences (Cheng and Sybesma 1999; Yang 2001) (7ii); in episodic sentences, they can receive either a definite or an existential reading in both subject and object position (Yang 2001) (7iii).

(7) Mandarin Bare nouns
     (i) bare nouns with kind level predicates
         <u>*xiong*</u> *jue-zhong   le.*
         bear   vanish-king Asp
         'The bear is extinct.'   (Krifka 1995, ex. 1a)

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    (ii) bare nouns in generic sentences
      gou hen   *jiling.*
      dog very smart
      a. 'Dogs are intelligent.'
      b. 'The dog(s) is/are intelligent.'   (Yang 2001, ex. 12c)
    (iii) bare nouns in episodic sentences
      a. *waimian gou* *zai*   *jiao.*
        outside   dog   Prog bark
        i. 'Outside, dogs are barking.'
        ii. 'Outside, the dog(s) are/is barking.'   (Yang 2001, ex. 31)
      b. *fangjian*   *li*   *zuo zhe* *yi* *ge nansheng* *yi*   *ge nvsheng,*
        room   inside sit Prog one Cl boy   one Cl girl
        nansheng *kan-qi-lai* *hen* *nianqing.*
        boy   look   very young
        'There is a boy and a girl sitting in the room; the boy looks very young.'

It is worth emphasizing that, as discussed in Yang (2001) and X. Li (2011), the scope properties of bare nouns in Mandarin (and as we shall see shortly in Yi) regarding their indefinite reading resemble those of English bare plurals (e.g. dogs) rather than those of lexical indefinites (e.g. a/some dog(s)). Since Carlson (1977), it has been known that English bare plurals systematically differ from regular indefinites in their scope properties. Bare plurals have *only* a narrow scope existential reading, while regular indefinites can receive both a wide and a narrow scope reading under negation and under other scope bearing elements. For example, the bare plural 'dogs' in (8a) only receives the reading where it takes scope under negation, whereas the regular indefinite 'a dog' in (8b), can have either a narrow scope or a wide scope reading.

(8)   a. I didn't see *dogs*.   ¬>∃/ *∃>¬
        b. I didn't see *a dog*.   ¬>∃/ ∃>¬

In addition, indefinites can escape all islands for extraction (Ruys 1992: 102-103), as exemplified in (9a). Unlike definites which always take wide(st) scope, indefinites can escape islands *without* having the widest sentential scope (Farkas 1981; Ruys 1992; Abusch 1994). An example to demonstrate this point is given in (9b). The indefinite 'a student of his' can escape the adjunct island and have a scope narrower than the sentence initial scope-bearing element 'every'. The scope of this type (e.g. (9bi)) is usually referred to as *Intermediate Scope*.

(9)   a. If John hires *two workers*, he will be in good shape.
           i). Wide scope: two workers > if   ii). Narrow scope: if > two workers
      b. Every professor will rejoice [if *a student of his* cheats on the exam].
          i). Intermediate Scope: every > a student of his > if
          ii). Narrow Scope: every > if > a student of his   (Ruys 1992)

In Mandarin, if we set aside the definite interpretation, bare nouns behave just like English bare nouns: they can receive a narrowest existential interpretation (10iia) and

(11iia), but not a wide scope reading (10iib) nor an intermediate scope reading (11iib) (e.g. see Yang 2001, X. Li 2011).

(10) *mei   ge ren dou zai   kan <u>xin</u>.*
      every Cl man all   Prog read letter
      i. 'Everybody is reading the letter.' [definite]
      ii. 'Everybody is reading letters.'
         a. Narrow scope: [∀> some letters] b. *Wide scope: *[some letters/a letter >∀]
                                          (X. Li 2011, ex 19b with slight modification)

(11) *dabufen yuyanxuejia dou kan-guo   mei-ge   [jiejue <u>wenti</u> de] fenxifangfa.*
      most   linguist   all look-Asp every-CL solve problem DE analysis
      i. 'Most linguists have looked at every analysis that solves <u>the problem</u>.'
      ii. 'Most linguists have looked at every analysis that solves problems.'
         a. <u>Narrow scope</u>:   [most >∀> problems]
         b. *<u>Intermediate scope</u>:   *[most >some problems/a problem>∀]
                                          (Yang 2001, ex. 26)

Turing to Yi, we note that its bare nouns behave just like those in Mandarin with respect to semantic interpretations and syntactic distributions, as exemplified in (12).

(12) Yi bare nouns
       (i) bare nouns with kind-level predicates
         <u>ko-lo</u>   gi   o.
         dinosaur extinct SFP
         'Dinosaurs are extinct.'
      (ii) bare nouns in generic sentences
         Aka <u>khɯ</u> ʨe si ko-ba.
         Aka dog scared very much
         'Aka is scared of dogs very much.'
      (iii) bare nouns in episodic sentences
         a. *Aka <u>thɯ-zi</u> vi   bo o*.
            Aka book   buy go SFP
            i. 'Aka went to buy books.'
            ii. 'Aka went to buy the book(s).'
         b. *ne <u>si-hni</u> shyp ngop ddu ggep la go-li, nga khat   ox.*
            you girl   bring my   home play come if, I   happy SFP
            i. 'If you bring the girls to hang out in my house, I will be happy.'
            ii 'If you bring girls to hang out in my house, I will be happy.'
             (a). Narrow scope existential [if >girls] (b). *Wide scope [*some girls > if]
         c. *si-hni ma sini sse-vo ma i go   nyi, <u>si-hni</u> dʑi ndʐa.*
            girl   CL and boy   CL house sit, girl   very beautiful
            'A girl and a boy are sitting in the house, the girl is very pretty.'

Summarizing up so far, Yi and Mandarin behave rather similarly in the nominal domain, i.e. a classifier is obligatory when numerals combine with nouns, their NCs share three

common properties, and their bare nouns behave alike regarding the syntactic distribution and semantic interpretations; however, we do observe two dimensions of variation that distinguish them from each other.

2.2   Differences between Mandarin and Yi

First, Mandarin and Yi differ in whether numeral-less classifier phrases (a.k.a *bare ClPs* in the literature), are freely allowed. This is a dimension along which ClLs vary significantly (see Cheng and Sybesma 1999, 2005; Simpson 2005). For instance, Cantonese freely allows bare ClPs in both subject and object position with a *definite* interpretation (e.g. Cheng and Sybesma 1999) (13), Mandarin only allows *indefinite* ones in a restricted way, i.e. in a position immediately following a verbal element or a stressed nominal element (cf. e.g. Lü 1944) (14), and Korean/Japanese simply bans them (15).

(13)   a. *bzek gau* zungji sek juk.   (Cantonese)
           CL dog   like   eat meat
           'The dog likes to eat meat.'
        b. *Ngo zungji tong zek gau* waan.
           I   like   with CL dog play
           'I like to play with the dog.'   (Cheng and Sybesma 1999: 511 (6))

(14)   a. **ge xuesheng* yinggai haohao   xuexi.   (Mandarin)
           Cl student   should good-good study
           Intended: 'A student should study hard.'
        b. *wo jiao   le   ge nongmin, *ge xuesheng   he   ge gongren.*
           I   teach Asp Cl farmer,   Cl student   and Cl worker
           Intended: 'I taught a farmer, a student and a worker.'

(15)   a. **soi mali-ka   swuley-lul kkul-ko   iss-ta.*   (Korean)
           cow Cl   -Nom cart-Acc   pull-Del Prog-Decl
           Intended: 'The/One cow is pulling a cart'
        b. **na-nun   haksayng myeng-ul   po-ass-ta.*
           I-Top   student   Cl-Acc   see-Past-Decl
           Intended: 'I saw a student.'

Compared with bare ClPs in other ClLs, Yi bare ClPs behave quite differently in that although they are freely allowed in both subject and object position, they *only* receive an *indefinite* interpretation (16).

(16)   a. *tsho   ma* dza dzu ndzɔ.   [indefinite]
           person CL rice   eat Progressive
           'A person is having meal.'
        b. *tshi mu   ma   ʂu   bo o.*   [indefinite]
           3s   horse Cl   look-for go SFP
           'He/She went to look for a horse.'
        c. *si-hni ma sini sse-vo ma i go   nyi, #si-hni ma dzi ndza.*   [*definite]
           girl Cl and boy   Cl house sit, girl   Cl   very beautiful

Intended: 'A girl and a boy are sitting in the room; the girl is very pretty.'

d. <u>*a-nyie ma*</u> *a-hie yo yie.*   [generic]
   cat   CL   mouse catch   should
   'A cat should catch mice.'

e. *<u>*ko-lo ma*</u> *gi o.*   [*kind]
   dinosaur CL extinct SFP
   Intended: 'Dinosaurs are extinct.'

These examples illustrate how Yi bare ClPs can freely appear in subject and object position in episodic sentences, receiving an indefinite interpretation (16a, b); this is also supported by the fact that they cannot be used anaphorically (16c). They can appear in generic sentences with a generic interpretation (16d) but cannot occur with kind level predicates (16e). In other words, they seem to behave like English singular indefinites.

     The second dimension of variation between Mandarin and Yi lies in the existence of an overt definite determiner. Like the majority of ClLs, Mandarin lacks overt article determiners like 'the' or 'a' although it does have, of course, demonstratives. Yi, in contrast, has a morpheme *su* that has all the functions that definite determiners like English 'the' have (e.g. Jiang and Hu 2010; Jiang 2012).[4] *Su* appears in the final nominal position; it turns indefinite NCs and indefinite bare ClPs (17a, b) into definites (17a′, b′).

(17)   a. <u>*zhuop-zyr sɔ ma*</u>   a′. <u>*zhuop-zyr sɔ ma **su***</u>   (Yi)
       desk   three Cl   desk   three Cl SU
       'three desks'   'the three desks'

    b. <u>*tsho ma*</u>   b′. <u>*tsho ma **su***</u>
       person CL   person CL SU
       'a person'   'the person'

It is important to point out that the post-nominal morpheme *su* differs from demonstratives in Yi, which appear in the position between nouns and classifiers, and cannot co-occur with them (18).

(18)   a. *zhuop-zyr*   <u>*tshɿ/a daɹ*</u> *sɔ ma (*<u>su</u>)*   (Yi)
       desk   this/that   three Cl   SU
       'these/those three desks'

    b. *zhuop-zyr*   <u>*tshɿ/ a daɹ*</u> *ma (*<u>su</u>)*
       desk   this/that   Cl   SU
       'this/that desk'

In addition to being used referentially, *su*-phrases can also be used anaphorically to pick the maximal entity in an antecedent clause (19), much like definites in English. The anaphoric use of su-phrases is identical to that of bare nouns (12iiic). What this shows is that definiteness can be expressed either via bare nouns or *su*-phrases in this language.

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[4] The origin of the morpheme *su* is the noun 'person' in Yi (Dai and Hu 1999; Hu 2002). Discussions on the grammaticalization of *su* can be found in Dai and Hu (1999), Kokado (2000), Hu (2002), Hu and Jiang (2010), and Liu and Gu (2011).

(19)   a. *si-hni nyip ma sini sse-vo ma i go   nyi, si-hni nyip ma su dzi ndʐa.*
       girl   two Cl and boy   Cl house sit, girl   two Cl SU very beautiful
       'Two girls and a boy are sitting in the room; the two girls are very pretty.'
       b. *si-hni ma sini sse-vo ma i go   nyi, si-hni ma su dzi ndʐa.*
       girl   Cl and boy   Cl house sit, girl   Cl SU very beautiful
       'A girl and a boy are sitting in the room; the girl is very pretty.'

Furthermore, *su*-marked NCs can occur in generic sentences; however, they do not receive the same generic interpretation as NCs in Yi.[5] The contrast between Yi NCs and *su*-marked NCs is given in (20a, b) and (20c, d).

(20)   a. *si-hni sɔ   ma   gaqip gur qy dox.*
       girl   three Cl   piano Cl   lift can
       'Three girls can lift a piano.'
       b. *shur   nyip ma ggot cyp ggat zip da   ap   hxit.*
       pheasant two Cl   closed one place put Asp NEG can
       'Two pheasants cannot be kept in the same place.'
       c. *si-hni sɔ   ma su   gaqip gur qy dox.*
       girl   three Cl SU   piano Cl   lift can
       'The three girls can lift a piano.' Not: 'Three girls can lift a piano.'
       d. *shur   nyip ma su ggot cyp ggat zip da   ap   hxit.*
       pheasant two Cl SU closed one place put Asp NEG can
       'The two pheasants cannot be kept in the same place.'
       Not: 'Two pheasants cannot be kept in the same place.'

One may wonder whether *su* could be a case marker. We only saw examples with *su*-phrases in argument position, so it could be the case that *su* is a nominative or an accusative marker. However, it turns out that *su*-phrases can freely co-occur with overt oblique case markers (21); this excludes the possibility that *su* is a structural case marker.

(21)   *Aka bbap-ga ma su   ta   la.*
       Aka village   Cl SU Ablative come
       'Aka comes from the village.'

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[5] An exception to this generalization is that in a rather specific generic structure in which the predicate is like 'worth', 'cost', or 'sell' with present tense, and the internal argument is a NC like '*n* dollars', *su*-marked NCs could receive the same generic interpretation as NCs (1aii) and (1b) in addition to a definite interpretation (1ai).
(1) a. *mu   sɔ   ma su sɔ   tu   va   bi.*
       horse three Cl Su three thousand dollar give
       (i) 'The three horses cost three thousand dollars.' (ii) 'Three horses cost three thousand dollars.'
    b. *mu   sɔ   ma   sɔ   tu   va   bi.*
       horse three Cl   three thousand dollar give
       'Three horses cost three thousand dollars.'
We now do not have an account for the above exception and will leave the question as to why *su*-marked NCs in a fixed generic structure can receive the same generic reading as NCs for future research.

The data presented above show that *su* contributes to the definite interpretation of Yi NCs and bare ClPs. *Su*-phrases can be used not only referentially but also anaphorically to refer to the maximal entity in the antecedent clause. The maximality effect that *su*-phrases exhibit is a manifestation of their definite nature. We also saw that phrases containing *su* have generic uses in generic sentences. Structurally, *su* appears in the post-nominal position, differing from demonstratives in Yi that occur in the position between nouns and classifiers. Based on such data, it is legitimate to claim that *su* has the same role as elements that are uncontroversially assumed to be definite determiners (e.g. English 'the') and that it should be analyzed as such.

Interestingly, although *su* combines freely with NCs and bare ClPs, it cannot combine directly with bare nouns (and demonstratives cannot either, to be shown in Section 5.1), as illustrated in (22). In order to make (22) grammatical, a classifier needs to be added after the noun, or *su* has to be removed.

(22)   *<u>*si-hni* **su** *dʑi ndʐa.*</u>   (Yi)
         girl   SU very beautiful

To summarize this section, we saw three similarities and two dimensions of variation between Mandarin and Yi with regard to their nominal arguments. It was shown that their similarities are quite uniform across ClLs. ClLs differ a great deal along the first dimension of variation, while variation along the second dimension -- the existence of an overt determiner -- is rarer (Yi appears to be the only ClL with an overt article-like determiner found so far). In the next section, we will examine the behavior of NCs at the clausal level; this will turn out to provide us with a good starting point to understand nominal arguments in Mandarin and Yi.

3   The external syntax and semantics of NCs: A baseline proposal

This section examines the external syntax and semantics of NCs like *three cats/san zhi mao* 'three Cl cat'. The reason for doing so is to show that their syntactic distribution and semantic interpretations display a formidable uniformity across languages, regardless of whether the language is a number marking one or a classifier one and whether or not it has an overt D. Presumably, this behavior is universal, hence the result of combining a numeral with a nominal should receive a uniform analysis across languages. We will sketch such analysis, and this will constitute our baseline. From it, we hope to arrive at understanding the inner components of nominals by 'subtraction', so to speak.

3.1   Some tendentially universal patterns of NCs

In Section 2, we saw three properties of NCs in Mandarin and Yi (cf (3)); these properties are also attested in NMLs regardless of 'how much D' they have. Here they are illustrated for English, French and Russian:

(23)   English NCs
         (i) Property 1: Predicative uses
              John and Bill are <u>two boys</u>.

(ii) Property 2: Restrictors of definites/quantifiers
    a. John hired <u>the/those two boys</u>.
    b. I made different assignments for <u>every four students</u>.
(iii) Property 3: Argumental indefinites and existential readings
    a. John hired <u>two workers</u>.   b. There are <u>two workers</u>.

(24)   French NCs:
(i) Property 1: Predicative uses
    Ils   sont <u>deux étudiants</u>
    They are two students
    'They are two students.'
(ii) Property 2: Restrictors of definites/quantifiers
    Les /ces   <u>deux chats</u>
    The/these two cats
    'The/these two cats'
(iii) Property 3: Argumental (indefinite): narrow scope existential reading
    a. *J'ai vu <u>deux chiens</u>.*   b. *Il y a   <u>deux chiens</u>.*
      I   saw two dogs   there have two dogs
      'I saw two dogs'   'There are two dogs'

(25)   Russian NCs:
(i) Property 1: Predicative
    Ivan i   Anna <u>dva studenta</u>
    Ivan and Anna two students
    'Ivan and Anna are two students.'
(ii) Property 2: Restrictors of definites/quantifiers
    Eti   <u>pjat' koshek</u>
    these five cats
    'these five cats'
(iii) Property 3: Argumental (indefinite): narrow scope existential reading
    a. *V komnate <u>pjat' sobak</u>.*   b. *Ja   videla   <u>pjat' sobak</u>.*
      in room   five dogs   I-nom see.past five dogs
      'There are five dogs in the room.'   'I saw five dogs'

Now, English, French and Russian differ greatly in DP-structure. English has overt Ds but also allows bare arguments. French has overt Ds and systematically disallows bare arguments. Russian has no overt Ds (i.e. articles). Yet, their NCs appear to be identical with respects to the properties in (23)-(25), shared also by ClLs, as we saw. This identity extends also to further properties of NCs, namely:

(26)   Three additional common properties of NCs across languages
(i) Property 4: Lack of anaphoric uses
(ii) Property 5: Long-distance scope interpretation and island-escaping ability
(iii) Property 6: Generic construal

We illustrate schematically these properties for English in (27)-(29). Parallel facts for French, Russian, Mandarin and Yi are provided in the Appendix.

(27)   Lack of anaphoric uses:
        a. John bought two dogs and five cats. #(The/Those) <u>five cats</u> are very expensive.

(28)   Long distance scope taking of NCs
        a. [If John hires *two workers*] he will be in good shape.
           i). **Wide Scope**:   [two workers> if]
           'There are two workers such that if John hires them, he will be in good shape.'
           ii). Narrow Scope: [If >two workers]
           'If Joohn hires any two workers, he will be in good shape.'
        b. Every professor will rejoice [if *three students of his* do well on the exam].
           i). **Intermediate Scope**:   [Every >three students of his> if]
           'For every professor x there are three students such that x will rejoice if those
            three students do well.'
           ii). Narrow Scope: [Every > if >three students of his]
          'Every professor will rejoice if any group of at least three students will do well.'

(29)   Generic uses of NCs in English
        a. <u>Three boys</u> can lift the piano.
        b. <u>Two canaries</u> can be kept in the same cage if it is large enough.
        c. <u>Six apples</u> cost one dollar.   (Krifka et al 1995, ex. 62, 99)
        d. Episodic counterparts of (a)-(b):
           i. <u>Three boys</u> are lifting a piano.
           ii. <u>Two canaries</u> were kept in the same cage yesterday.

The sentences in (29a-c) all report general properties of the NCs; they all constitute generic sentences in the sense of Krifka et al (1995: 2-3). For instance, 'three boys' in (29a) does not refer to three specific boys or to a *particular* event. This sentence expresses rather a quantificational statement *over events* and reports a general property that any three boys claimed to have. They contrast with the episodic sentences in (29d).

So, NCs appear to have identical syntactic distribution and semantic interpretation with respect to all of the six properties considered in the above data set, regardless of whether a language (obligatorily) requires overt Ds to argumentize nouns and whether a language allows numerals to combine directly with nouns. These facts lead us to the following generalizations on NCs.

(30)   Tendentially universal properties of NCs:
        i. NCs are always both predicative and argumental.
        ii. In their argumental role, they are always indefinites (with a peculiar scope).
        iii. In their non-argumental role, they can combine with a definite element/marker
and then (and only then) they become definite.
        iv. Properties i-iii are stable, regardless of whether or not a language has (overt)
Ds and whether or not a language is a NML or a ClL.

The question is then how would analysis of these very general facts look like.

3.2   Basic assumptions and a general approach to NCs

The goal of the present section is to outline a general approach to NCs that can capture its uniform behavior across languages as shown above. We will begin with some terminologies and assumptions in the domain of quantification that are crucial to our discussions: *singularities, pluralities* and *kinds*.

3.2.1 Basic assumptions on singularities, pluralities and kinds

Since Link (1983), Landman (1989), and Schwarzschild (1996), the domain of quantification, which contains ordinary singular individuals and plurals, has been assumed to have a structure that can be schematically represented as follows:

(31)   a∪b∪c ....
                a∪b b∪c a∪c .....
                a   b   c   .....

The domain in (31) constitutes an atomic semilattice closed under a join operation '∪' (group formation) and partially ordered by a 'part of' relation '≤' (so that a ≤ a∪b, a∪b ≤ a∪b∪c). Elements at the bottom of this structure are the atoms of this domain; these atoms are typically used to represent the denotation of definite singular expressions (like *John* or *that dinosaur*). Non-atoms such as a∪b are used to represent the denotation of plural definite expressions, like *John and Bill* or *those dinosaurs*.

Nouns divide the domain of quantification in sortally homogenous subspaces. For example, if a, b and c are all the dinosaurs there are, the extension of the singular noun *dinosaur* and that of the plural noun *dinosaurs* might be represented as follows.

(32)

$$\begin{pmatrix} a\cup b\cup c \\ a\cup b \quad b\cup c \quad a\cup c \\ [\, a \qquad b \qquad c \,] \end{pmatrix} \leftarrow\!\!\!-\!\!\!-\!\!\!-\!\!\!-\text{ dinosaurs}$$
$$\qquad\qquad\qquad\qquad\qquad \leftarrow\!\!\!-\!\!\!-\!\!\!-\!\!\!-\text{ dinosaur}$$

In (32) the singular noun *dinosaur* is true just of dinosaur-atoms. As for the plural nouns *dinosaurs*, we follow Saurland (2003) and assume that they includes singularities in its extension. Crucially, the plurality a∪b∪c in (32) is quite special in that it constitutes the totality of the dinosaurs there are. The maximal homogeneous pluralities are generally referred to as 'kinds' (see Carlson 1977 for details). To any natural properties, like the property of being a dinosaur, there always corresponds a kind, e.g. the dinosaur-kind. Vice versa, any natural kind will have a corresponding property (the property of belonging to that kind). The correspondence between (natural) properties and kinds suggests that there must be ways to get from the one to the other in systematic ways. As for English, a general view is that kinds can be obtained from plural properties through some null operation. Depending on one's theory, this kind formation in English takes

place either via a null D (e.g. see Longobardi 1994 et seq) or via a semantic operation that has no syntactic counterparts (e.g. see Chierchia 1998 et seq). We cannot completely settle down on this issue at this point and refer the readers to Dayal's (2011) review on the two approaches. What we would like to establish about kinds is that, under at least one view, plural properties can be turned to kinds, but singular properties cannot. This is so because the semantics of singularity clashes with the conceptual notion of a kind which corresponds to the plurality of all instances of the property (see Dayal 1992, Chierchia 1998 for details).

In addition to the above views on singularities, pluralities and kinds, we assume the following basic mechanisms presumably universally available in all languages that allow kinds to work in three ways. First, we can directly predicate kind-level predicates of kinds, like *Dinosaurs are extinct*. (e.g. see Carlson 1977). Second, in episodic sentences, kinds can undergo Derived Kind Predication (DKP in short, see Chierchia 1992, 1998) to achieve the existential reading. DKP is an operation that adjusts predicates when a sentence have an individual-level predicate with a kind-level argument by introducing a local existential quantifier over instances of the kind, which derives the existential interpretation of the argument from its kind denotation. This operation explains why bare plurals in episodic sentences (as in *Dinosaurs are roaring*.) behave different from definites. Third and last, in generic sentences like *Dinosaurs are animals*, kinds provide a restriction for the generic operator *Gen* however that is done (e.g. see Chierchia (1995) for one way and Dayal (2004) for another way). An advantage of the above story about kinds is that it accounts directly for why bare plurals in English behave like indefinites in generic sentences but unlike indefinites with kind-level predicates or indefinites in episodic sentences. Regarding how definite singulars like *the dinosaur* in English and Romance languages and how definite plurals in Romance languages like *les baleines* 'the whales' in French receive a kind or a generic interpretation, we refer the readers to Chierchia (1998) and Dayal (2004) for details.

3.2.2 An ambiguous approach to numerals

This sub-section outlines an analysis of numerals. We would like to point out that lots of the details of the numeral semantics are negotiable (since the core differences among various analyses do not significantly change what we will propose) but the syntax of bare, unmodified NCs are not. We will argue that when we have an indefinite unmodified NCs, there is no need to assume a null D in the syntax to argumentize the NCs. [6]

Based on the uniform behavior of NCs at the clausal level across languages shown in Section 3.1, a reasonable assumption about numerals is that its function is constant cross-linguistically. When numerals can combine directly with a noun, like *three cats*, what everyone would agree is that the noun 'cats' should denote property, type $\langle e, t \rangle$.

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[6] As one of the reviewers pointed out, modified NCs, like *exactly two books, about four books*, have differrent scope behaviors from those of bare, unmodified NCs discussed in this paper, i.e. the former lack the long-distance scope behavior (see also Kamp and Reyle 1993; Beghelli 1995; Beghelli and Stowell 1997; Szabolcsi 1997, 2010; Winter 2001, 2005, a.o.). Discussions in this paper only focuses on bare, unmodified NCs like *two books* and does not include modified NCs or other amount expressions, like *many books, few books*.

The reason is that numerals require the nominal that they combine with to denote a set containing atoms/groups. Hence, a rough structure of NCs would be the one below.

(33)   {three, cats}$_{<e,t>}$

three   cats$_{<e,t>}$
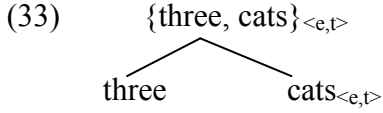
Building on Ionin and Matushansky (2006) and Winter (1997), we propose a lexical analysis of unmodified numerals in which numerals are treated as ambiguous (see also Dayal 2012b for a similar view), as illustrated in (34).

(34)   Lexical rule of ambiguous numerals
        a. Numeral$_{<<e,t>, <e,t>>}$ = $\lambda P[n(P)]$[7]   (Ionin and Matushansky 2006)
        b. If $[[\alpha]] \in$ Num$_{<<e,t>, <e,t>>}$, then $\lambda P\ f_\exists\ (\alpha\ (P)) \in$ Num$_{<<e,t>, e>}$
            $f_\exists$ is the choice function variable, subject to existential closure at arbitrarily chosen scope sites. (base on Winter 1997)

In (34a), we adopt the analysis of numerals as privative (non-subsective) adjectival modifiers, type <et, et>, as proposed in Ionin and Matushansky (2006).[8] Such a semantics of numerals directly explains three of the cross-linguistic properties of NCs: the predicative use, the use as restrictors of definites/quantifiers, and the use as restrictors of the *Gen* operator in generic sentences (see Krifka et al 1995 for discussions on *Gen* and genericity). Examples in (35) and (36) demonstrate how the latter two uses work. In (34b), we adopt Winter's (1997) choice function analysis of unmodified numeral indefinites. In this work, indefinites are assumed to involve a function variable in their semantics that assigns an individual to the restriction of the predicate (c.f. Winter 1997: 409, see also Reinhart 1997); this function is a choice function that is subject to existential closure. The existential quantification associated with the choice function is assumed to apply at any scope site (see Winter 1997: 409–411 for details). We refer the choice function variable that is subject to existential closure as '$f_\exists$', where *f* is a choice function. Crucially, differing from Winter (2001, 2005) who places the choice function variable in the syntax (i.e. in the D head), we attribute it in numerals as part their lexical semantics. In particular, each numeral n (of type <<e,t>,<e,t>>) can be viewed as a lexically predictable alternant of type <<e,t>,e>, formed via the lexical rule in (34). This choice function view of numerals directly accounts for why NCs behave unlike definites but like indefinites. The example in (37) demonstrates how the indefinite reading of NCs comes about. Importantly, the interpretation of the numeral indefinite *three boys* is determined by *the stage* at which existential closure is applied, the indefinite itself does not undergo any movement out of the adjunct island; thus *no* island constraint is violated.

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[7] The semantics of the numeral *n* could be simply analyzed as the one below:
(1) $[[n\ men]] = n(men) = \lambda P\lambda x\exists Q\ [Q\subseteq AT(P) \wedge |Q| = n \wedge x = \cup Q](men)$
The analysis above is not the same as the one proposed in Ionin and Matushansky 2006; however, it works for our purpose of discussion and allows us to capture complex numerals like *three hundred men* via recursive syntax and compositional semantics. We refer the readers to Ionin and Matushansky 2006 for a more explicit semantics of the numeral *n* in the same spirit.
[8] Note that, the analysis of numerals that we propose is also compatible with the view that treats numerals as restrictive adjectival modifiers (as in Link 1983; Bale et al 2010, a. o.).

(35) a. <u>The three boys </u>brought water. (NCs as restriction of definites)
    b. [[three]] = λP [three$_{<<e,t>, <e,t>>}$(P)] $<<e,t>, <e,t>>$
    c. [[three boys]] = three (boy) $<e,t>$
    d. [[the three boys brought water]] = brought (ι three (boy) (x), water)

(36) a. <u>Three boys </u>can lift the piano. (NCs in generic sentence)
    b. [[three]] = λP [three$_{<<e,t>, <e,t>>}$(P)] $<<e,t>, <e,t>>$
    c. [[three boys]] = three (boy) $<e,t>$
    d. [[three boys can lift the piano]]
       = ∀x, s [3(student$_s$)(x) ∧ C(x,s)] s' ACC(s,s') [lift$_{s'}$ (x, the piano)]
       where ACC is the accessibility relation: ACC (s, s') iff s' is accessible from s;
       'C' is a contextually salient relation between individuals and situations: C(x,
       s) iff x is contextually relevant in s (e.g. x is in a situation s in which the
       piano needs to be lifted) (e.g. see Krifka et al 1995).[9]

(37) a. If John hires <u>three boys</u>, he will be in good shape. (NCs as indefinites)
    b. [[three]] = λPf$_∃$ [three$_{<<e,t>, <e,t>>}$ (P)] $<<e,t>, e>$
    c. [[three boys]] = f$_∃$ (three (boy)) $<e>$
    d. [[If John hires three boys, he will be in good shape]]
       = [∃x (three boys)(x) ∧ hired (John, x)] → in good shape (John)   *or*
       = ∃x (three boys)(x) ∧ [hired (John, x) → in good shape (John)]

The approach in (34) relates the predicative use of NCs to their argumental use in a
systematic way; the structure of NCs (both predicative and argumental ones), therefore,
can be simplified with a uniform syntax across NMLs, as illustrated in (38).

(38) Structure of NCs in NMLs
    a. {n, {-*s*, NP}}$_{<e,t>}$ → predicative   b. {n, {-*s*, NP}}$_{<e>}$ → argumental (indefinite)

    NumP   NumPf$_∃$

    n$_{<et,et>}$ -*s*$_{<et,et>}$ NP$_{<e,t>}$ *n*$_{<et,e>}$ -*s*$_{<et,et>}$ NP$_{<e,t>}$

The structure of NCs in (38) is represented in the framework of *bare phrase structure* as
in Chomsky (1994 et seq.). The number feature head -*s* first merges with the noun,
forming a unorderred set {-*s*, NP} (see Chomsky 2004: 108 for details regarding
unordered sets); this set further merges with a numeral *n*, forming a larger set {n, {-*s*,
NP}}. In this structure, we adopt the analysis that numerals are phrasal (e.g., Selkirk
1977; Li 1999; Borer 2005; Ionin and Matushansky 2006; Di Sciullo 2012; a.o.).
    In (38), the choice function variable f$_∃$ is built in the lexical semantics of numerals,
so the argumental NC (38b) can be shifted from its predicative counterpart (38a) via the
lexical operation in (34) in a systematic way. Here, we provide one empirical and one

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[9] In (36c), 'three boys' can either remain as a predicate of type <e,t> with *Gen* binding it, or it can be
shifted via the choice function variable f$_∃$ to an individual with a nonspecific interpretation with *Gen*
quantifiering over individuals and situations. Both approaches are discussed in details in Krifka et al
(1995). The analysis of numerals developed here is compatible with both approaches.

theoretical motivation for the lexical approach to NCs proposed in (34) and (38). The empirical motivation comes from the stable cross-linguistic property of NCs. As we saw in Section 3.1, although languages may differ greatly with respect to argumentizing bare nouns (e.g. obligatorily, optionally or not at all via an overt D), they systematically allow NCs to freely appear in argument position with a peculiar scope interpretation. The stable argumental behavior of NCs across languages suggests that NCs must have a different source to form arguments from bare nouns which vary cross-linguistically. Such a source that enables all NCs to behave in a rigid way, if it is not from the narrow syntax, is very likely to lie in the lexical entry of numerals. Turning to the theoretical consideration of this lexical view, it provides a unified approach to NCs to both NMLs and ClLs. The choice function variable built into the lexical entry of numerals is not subject to the existence of any functional head which might be subject to parameterization (e.g. D). In other words, the lexical view of numerals can reduce unnecessary theoretical assumptions and parameterization regarding NCs in the syntax, helping us to maintain a minimalist fashion of linguistic inquiry.

Admittedly, one can accommodate the choice function in the syntax rather than in the lexical entry of numerals. For example, the choice function can be tied to some functional head that presumably is available in all NMLs and ClLs given that their NCs exhibit uniform behaviors. Or, we can assume that the choice function is linked to some functional head which might be subject to parameterization, e.g. a null D (as pursued in Winter 2001, 2005 for English); this null D merges with the predicative NC in (38a), yielding a DP with an indefinite interpretation, in the same way as an overt definite D merging with a predicative NC to create a DP with a definite interpretation (e.g. _the two boys_). If we pursue this syntactic analysis of the choice function, we then need to make other assumptions as to where the choice function is realized in languages without such a functional head (i.e. languages without Ds). Even if we assume that languages without overt determiners also project null DPs in the syntax, we then need to explain why bare nouns, such as English _dogs_, do not have the same scope behavior as NCs like _two dogs_ since they might as well be argumentized via a null D. As we saw in (8a), (10) and (12), bare nouns in English, Mandarin, and Yi only receive a narrowest scope existential interpretation. Of course, one can further assumes two types of null Ds: one is linked to the choice function variable and merges with NCs, leading to the long-distance scope behavior; the other merges with bare nouns and only contributes to the narrowest existential reading (e.g. the Longobardi's (1994) style of null D). However, such a parametric approach of Ds not only doesn't show advantage over the lexical approach of numerals, but also it inevitably increases stipulations in the syntax. [10] No matter what assumption about NCs one makes, it should capture their unvarying argumental behavior across languages as well as their idiosyncratic scope behavior. The proposed lexical analysis of choice function straightforwardly captures this cross-linguistic uniformity; it
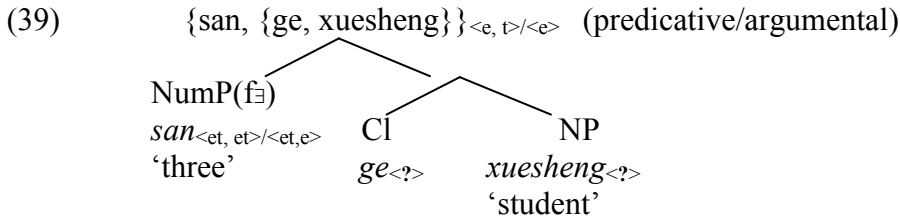
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[10] A potential question may arise here, namely, why the source of choice functions cannot be a covert semantic operation like type-shifting. This semantic assumption is theoretically plausible. However if we allow such a covert semantic operation for NCs in French, say, one would like to know why it is not available for bare nouns. Admittedly, one can always make some assumptions to explain this puzzle; however, we believe that adding further assumptions would inevitably result in a more stipulative theory than the proposed lexical analysis.

also displays theoretical advantages over a narrow syntax based analysis which inevitably would be more stipulative.

In the following sub-section, we illustrate how the lexical approach to numerals in (34) applies to ClLs like Mandarin.

3.3   NCs in Mandarin: extending the baseline proposal to ClLs

As we saw in Section 3.1, the behavior of NCs exhibit exceptional uniformity across languages, so one may wonder whether we can apply the analysis of NCs sketched above to ClLs as well. Indeed, it is unavoidable to analyze NCs across languages in a similar way since such an analysis not only explains the cross-linguistically uniform behaviors of NCs, but also it avoids language specific assumptions about NCs. Under such an approach and building on the structure of Mandarin NCs proposed by Li (1997) and Cheng and Sybesma (1999), a rough analysis of NCs in ClLs could be the one below.

(39)   {san, {ge, xuesheng}}$_{<e,\ t>/<e>}$ (predicative/argumental)

NumP(f∃)
$san_{<et,\ et>/<et,e>}$ Cl   NP
'three' $ge_{<?>}$ $xuesheng_{<?>}$
                                            'student'

In (39), the behavior of numerals is constant across languages and the output of NCs, i.e. being predicative or argumental, is also the same cross-linguistically. What remains unknown is the semantics of classifiers and that of bare nouns, to be analyzed in details in Section 4. Although we haven't fully understood the internal domain of NCs in ClLs yet, this preliminary analysis in (39) is sufficient to explain the predicative use of NCs in ClLs as well as their argumental use (i.e. indefinite). We illustrate it with two examples from Mandarin below where *CH(f)* means that *f* is a choice function (with the semantics of the unknown parts underlined).

(40)   a. *Zhangsan, Lisi, Wangwu shi san ge xuesheng*.
          Zhangsan Lisi Wangwu be   three Cl student
          'Zhangsan, Lisi, and Wangwu are three students.'
        b. [[san]] = λP∃ [three$_{<<e,t>,\ <e,t>>}$ (P)] $<<e,t>, e>$
        c. [[san ge xuesheng]] = [three(ge(student))] $<e, t>$

(41)   a. *ruguo ni   neng dai liang   ge nvsheng lai   wo-de party de-hua,*
          if   you can   bring two   Cl girl   come my   party if
          wo hui   hen kaixin.
          I   will very happy
          'If you can bring two girls to my party, I will be very happy.'
        b. [[liang]] = λP∃ [two$_{<<e,t>,\ <e,t>>}$ (P)] $<<e,t>, e>$
        c. [[liang ge nvsheng]] = f∃ (two(Cl(girl))) $<e>$
        d. Wide scope reading:
             ∃f [CH(f) ∧ [bring (you, f (two(Cl(girl)))) → happy (I)]]   [two > if]

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e. Narrow scope reading:
   [∃f [CH(f) ∧ bring (you, f (two(Cl(girl)))))]] → happy (I)   [if > two]

Concerning the generic use of NCs in Mandarin (an example is repeated in (42a)), it has been referred to as 'the number-denoting interpretation of NCs' by Li (1998). However, as we have shown in Section 3.1, this type of uses of NCs is better analyzed as generic in contrast with NCs in episodic sentences (e.g. (29)). In particular, the generic interpretation of the nominals is contributed by the *Gen* operator which quantifiers over the whole sentence. The sentence in (42a), hence, can be analyzed in same way as its English counterpart, as illustrated in (42d) (with irrelevant details omitted).

(42)   a. *san   ge   nansheng* *keyi tai-qi yi   jia gangqin*
          three Cl   boy   can lift-up one Cl   piano
          'Three boys can lift one piano.'
       b. [[san]] = λP [three$_{<<e,t>, <e,t>>}$(P)] $<<e,t>, <e,t>>$
       c. [[san ge nansheng]] = [three(ge(boy))] $<e, t>$
       d. [[san ge nan sheng keyi taiqi yi jia gangqin]]
          = ∀x, s [3(Cl(boy$_s$))(x) ∧ C(x,s)] s' ACC(s,s') ◊ [lift$_{s'}$ (x, one piano)]

Note that, although Mandarin NCs share important properties with those in NMLs at the clausal level, there exist a strong tendency to interprete nominal arguments in subject position in Mandarin as definite in episodic sentences (see Chao 1968; Li & Thompson 1981, a.o.). In particular, sentences containing NCs with an indefinite interpretation in the sentence initial position are not that natural, and a verb *you* 'exist' is required to improve the acceptability, as illustrated below.

(43)   ??(*you*) *san   ge   xuesheng* *chile dangao*.[11]
          exist three Cl student   ate   cake
          'Three students ate the cake.'   (Li 1997: 2, (1b) with slight modification)

To explain this interpretational tendency in Mandarin, some authors assume a null D for argumental NCs which is subject to government along the line pursued in Longobardi 1994 for Italian bare plurals (e.g. see Li 1998). Nevertheless, such a government-based null D analysis of Mandarin NCs has been challenged both empirically and theoretically; detailed reviews of this null D analysis can be found in Yang (2001: 47-50), E. Tsai (2011: 1-17) and Jiang (2012: 123-126). One of the arguments against the null D analysis of Mandarin NCs is that by assuming a null D with an existential force projecting above NCs in Mandarin as pursued in Li (1998), one would expect Mandarin NCs to behave like bare plurals in Italian or English, which only receive a narrowest scope (existential) interpretation. But this is not the case: Mandarin NCs behave like English *some/a* and numeral indefinites regarding long-distance scope, as we saw in Section 3. In addition, other authors have observed a range of well-acceptable examples containing indefinite

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[11] As pointed by Li (1998), sentences of this sort improve if they are answers to *how many* questions. The question is why the traditional literature mark such sentences as unacceptable. Perhaps it is because such examples are often cited out of context, and because such sentences are not acceptable unless there is a clear linguistic quantity interpretation context (c.f. Li 1998: 694, footnote 3).

NCs or examples containing bare nouns with an existential reading in subject position in Mandarin (see Huang 1997; Yang 2001; X. Li 2011; Jiang 2012). These examples observed by the above authors should not be simply labeled as 'marginal' cases or be put aside as exceptions; instead they require acknowledgement. Very importantly, it is *not* the case that Mandarin ban indefinite NCs with an existential reading in subject position in episodic sentences, it is that in a out-of-blue context, these examples are usually marked as unnatural; if contexts are provided, examples of this sort become acceptable (see Li 1998: 694; Jiang 2012: 113-118). Based on such empirical facts, a reanalysis of the interpretational tendency in (43) and these well acceptable sentences along the lines consistent with the present D-less approach to Mandarin NCs has been proposed in Yang (2001), E. Tsai (2011) and Jiang (2012). For example, in Yang (2001) and Jiang (2012), it was argued that sentence initial position in Mandarin is topic position, which only allows nominals with a definite or specific interpretation. They then explain the interpretational tendency via a typological and pragmatic account based on Li and Thompson's (1997) categorization of topic-prominence and subject-prominent languages and Lambrecht's (1994) Topic Acceptability Scale.[12]

　　Summarizing Section 3, we showed a uniform account of numerals and NCs in which NCs are systematically ambiguous (in the Universal Lexicon) between a predicate modifier and an indefinite variant; this account captures the tendentially universal properties of NCs across languages regardless of whether a language is a ClL or a NML and whether or not a language has Ds. With such an analysis, we look into the internal domain of NCs in Section 4 so as to arrive at the properties that are specific to ClLs.

4. The Internal Structure of NCs in ClLs

　　In the internal domain, NCs in ClLs share certain similarity with NCs in canonical NMLs.[13] Take English and Mandarin for example, in English, the plural number marking *-s/-es* is obligatory when a numeral (other than 'one') combines with a count noun (58a, a′). Although Mandarin does not have the same canonical number marking as English, it has classifiers, which are also obligatory when a numeral combines with a noun (44b, b′).

(44)　a. *three　　students*　　　　　a′. * *three　student*
　　　b. *san　　ge　xuesheng*　　　　b′. * *san　　xuesheng*　　　　(Mandarin)
　　　　　three　Cl　student　　　　　　　three　student
　　　　　'three students'

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[12] Relevant to the present discussion is distribution of 'plural' noun phrases in Mandarin, e.g. Li 1999. See Jiang (2012) for a reanalysis of Li's generalization along lines consistent with the present approach.

[13] 'Canonical NMLs' here refers to standard number marking languages such as Romance and Germanic languages where number morphology is obligatory when a numeral combines with any count noun. Canonical NMLs do not include languages like Turkish, Hungarian or Western Armenian, which have number morphology on bare nouns without the occurrence of numerals but *ban* number morphology or optionally allow it on nouns when they appear with a numeral. These languages will be referred to as non-canonical number marking languages. The variation between canonical NMLs and non-canonical NMLs in the literature has been attributed to a different semantics for their numerals (Bale et al 2010), or the different semantics of the functional head determines number morphology on nominals (Sauerland 2003; Sauerland et al 2005; Scontras 2012), or differences with respect to syntactic Agreement (Ritter 1991; Frank 1994). We leave these non-canonical NMLs for future research.

Setting aside the above similarity, NCs in NMLs and ClLs differ significantly in their internal domain. The first difference shows up when the numeral is removed from the nominal domain. When numerals do not occur, phrases in the plural form {-*s*, N} (in English but not in French) can *freely* occur in argument position (45a), but phrases in the form {Cl, N} in Mandarin cannot, e.g. (14), as repeated in (45b).

(45) a. i. *Students should study hard.*   ii. I taught *farmers, students* and *workers*.
      b. i. **ge xuesheng yinggai haohao   xuexi.*   (Mandarin)
              Cl student   should good-good study
              Intended: 'A student should study hard.'
          ii. *wo jiao le   ge nongmin,* **ge xuesheng** *he   ge gongren*.
               I   teach Asp Cl farmer,   Cl student   and   Cl worker
               Intended: 'I taught a farmer, a student, and a worker.'

Note that, the difference illustrated in (40) is also one of the two differences between Mandarin and Yi (e.g. (14), (16)), as discussed in Section 2. Another difference between NMLs and ClLs emerges when the functional head, i.e. number morphology/classifiers, is absent *together* with the numeral from within the nominal domain. Bare singular nouns in English cannot appear as bare arguments (while in Russian they can) (46a), but in ClLs all nouns can *always* merge *directly* with a verb and occur *freely* as bare arguments (46b).

(46) a. i. **Student should study hard.*   ii. *I taught *student, farmer* and *worker*.
      b. i. *xuesheng yinggai haohao   xuexi.*   (Mandarin)
              student   should good-good study
              'Students should study hard.'
          ii. *wo jiao le   xuesheng, nongming he   gongren.*
              I   teach Asp student,   farmer   and worker
              'I taught students, farmers and workers.'

Next, number morphology is number specific, i.e. it is either singular or plural (47a), but classifiers are not, i.e. they remain the same regardless of singularity or plurality (47b).

(47) a. one student/two student**s**   b. *yi/liang   *(ge) xuesheng* (Mandarin)
                                               one/two   Cl   student
                                               'one student/two students'

The last difference between NMLs and ClLs with respect to their internal domain is that the classifier system is rich (e.g. there are various different types of classifiers), and classifiers are not treated as bound morphemes like -*s*/-*es*, as shown below.

(48) a. *san   **ge**   ren*   b. *san   **zhi**   bi*
          three Cl$_{individual}$ person   three Cl$_{individual}$ pen
          'three persons'   'three pens'
      c. *san   **bang** yingtao*   d. *san   **he**   yingtao*
          three Cl$_{pound}$ cherry   three Cl$_{box}$ cherry
          'three pounds of cherries'   'three boxes of cherries'

The observations on the differences and similarities between NMLs and ClLs immediately raise a puzzle, namely 'how can NCs in ClLs be so similar to those in NMLs in the external syntax and semantics yet so different from them in the internal domain?' In Section 4.1, we will present our analysis of the internal syntax and semantics of NCs in Mandarin and Yi.

4.1   The analysis of the internal syntax and semantics of NCs in Mandarin and Yi

Regarding the internal domain of NCs, many authors establish a connection between the number morphology and the classifier (T'sou 1976; Doetjes 1997; Cheng and Sybesma 1999; Borer 2005, a.o.). They either observe that the use of number morphology and that of classifiers are in complementary distribution (T'sou 1976, cf. Borer 2005: 93) or argue that their roles are parallel, e.g. classifiers and the number morphology both signal the presence of minimal parts (e.g. atoms/groups) (Doetjes 1997: 35). Based on either their complementary distribution or their parallel roles, those authors identify classifiers with the number morphology and propose that they should appear in the same position in the structure. Although the details of their analyses of the internal structure of NCs may differ, these authors seem to agree on a structure roughly like the one below.

(49)   {n, {Cl, NP}}/{n, {-s, NP}}

                 n   {Cl, NP}/{-s, NP}$_{<e, t>}$

                      Cl/-*s*   NP
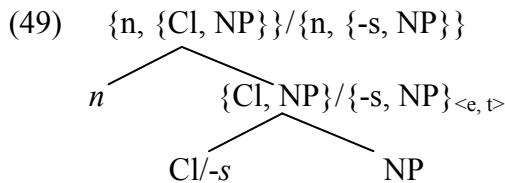
In (49), the classifier and the number morphology appear in the same position; they merge with a NP forming a larger phrase (i.e. {Cl, NP} and {-*s*, NP}) and further merging with a numeral *n*. We will adopt the structure in (49) to maintain the connection between the number morphology and the classifier.

As we argued in Section 3.1, numerals across languages are adjectival functions from properties into quantized properties or functions from properties to entities. When numerals combine with {Cl, NP}, it follows naturally that {Cl, NP} should denote properties. Then what we need to figure out next is what classifiers are doing. In particular, we need to understand why languages like Mandarin obligatorily require classifiers to connect a numeral with a noun whereas other languages like English do not.

One possible story that has been suggested is that nouns in Mandarin denote "properties", but they are properties "underspecified" for mass and count.[14] If Mandarin nouns are property-denoting, type <e, t>, then they will have to be true of something. Perhaps one way to understand this "underspecified" thesis is by assuming that in Mandarin, every noun can apply to either the whole individuals or the parts that they are of. Hence, *xia* 'shrimp' in Mandarin, for example, will be true in a world of shrimps or parts they are of (i.e. shrimp meat), so would have to be true with *gou* 'dog', *zhuozi* 'table', *shui* 'water, *xie* 'blood, and any other nouns. Then classifiers in Mandarin perhaps are

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[14] This story, although not being pursued for Mandarin, has been suggested by Dayal (2010) for Bangla, another ClL.

needed to quantize these nouns, i.e. to turn "underspecified properties" into "natural sub-properties" (atomic or non-atomic). For instance, *zhi xia* 'Cl$_{individual}$ shrimp' in Mandarin will be true in a world of a whole shrimp (i.e. a shrimp atom), but *bang xia* 'Cl$_{pound}$ shrimp' would not work in that way; instead it will be true in a world of a pound of shrimp meat.

The above story provides us with a arguably natural function for classifiers, namely that they carve underspecified properties into natural sub-properties. According to this view, the reason why Mandarin but not English obligatorily requires a classifier to connect a numeral and a noun is because nouns in Mandarin enter grammatical computations as properties underspecified for mass and count, but nouns in English, which are properties at some level, are pre-specified for mass and count (so that count properties can combine directly with numerals, while mass properties cannot).

Although this "underspecified property' thesis might seem appealing, it runs into a serious problem. As shown by both theoretical and experimental studies, nouns in Mandarin are lexically distinguished between mass and count even though they are not overtly marked with such a distinction (see Cheng and Sybesma 1999; Imai and Gentner 1997; Li et al. 2009, a.o.). In Li et al's (2009) experimental study, it has been shown that the pre-linguistic ontological distinction between substances and objects is central to our conceptual system and that speakers of a ClL, like Mandarin or Japanese, do make an ontological count-mass distinction. In addition, Cheng and Sybesma (1999) have argued that the mass-count distinction manifests itself through the classifier system: in Mandarin, there is a class of classifiers, i.e. 'individual classifiers' (these are the 'count-classifier' in Cheng and Sybesma 1999); this class has a series of distinctive syntactic properties and must combine with nouns that are conceptually count, as illustrated in (50). In contrast, other classes of classifiers, such as 'measure classifiers', 'container classifiers', or 'group classifiers', do not have such a restriction, i.e. they can combine with either conceptually count or mass nouns (51).

(50) a. *liang* *ge* *pingguo/xia* b. **liang* *ge* *rou/shui/mianfen*
   two   Cl$_{indvidual}$ apple/shrimp two Cl$_{indvidual}$ meat/water/flour
   'two apples/shrimps'

(51) a. *liang* *gongjin* *pingguo/xia* b. *liang* *gongjin* *rou/shui/mianfen*
   two   Cl$_{kilo}$ apple/shrimp two Cl$_{kilo}$ meat/water/flour
   'two kilos of apples/shrimps' 'two kilos of meat/water/flour'

The behavior of the individual classifiers presupposes that nouns in Mandarin are lexically divided to count and mass, e.g. it is the lexical property of *shui* 'water' and *mianfen* 'flour' that prevents them from combining with individual classifiers like *ge* in Mandarin. So if nouns in Mandarin in general are undistinguished in mass properties and count properties, the restriction on individual classifiers would have no force, and one would wrongly expect that individual classifiers like *ge* should work with both types of nouns just like other types of classifiers do. Hence, if nouns are properties in Mandarin, there is no good reason to justify classifiers.

Alternatively, suppose nouns in Mandarin are kinds (Krifka 1995; Chierchia 1998), and there can be mass kinds (e.g. water-kind) and count kinds (e.g. shrimp-kind),

depending on whether the instances of the kinds are atomic/whole objects or not. Of course, the literature on mass and count is huge, and we cannot settle this issue here, but the idea that there are going to be mass kinds and count kinds should be natural enough. As discussed in Section 3.2.1, kinds and (natural) properties are in a one-one correspondence. Therefore, if a distinction, say, being mass versus being count, applies to properties, it should also apply to kinds (and vice versa) (c.f. Chierchia 2010, see also Lima 2014).

When numerals, which are property-seeking, combine with kind denoting nouns, a type-mismatch arises. The kind approach, then, also provides a natural account for the obligatory existence of classifiers: they turn kind-referring nouns into properties so that the type-mismatch can be obviated. Under this view, a very natural difference exists between English and Mandarin. In English, when nouns enter the numeration as properties, count properties can combine directly with numerals, while mass properties cannot. In Mandarin, nouns are kind denoting and can be either mass kinds or count kinds; classifiers universally turn nouns into properties (atomic or non-atomic) so that they can combine with numerals. This difference, therefore, explains why Mandarin obligatorily requires classifiers when a numeral combines with a noun whereas English does not. It also immediately follows that individual classifiers will only be able to combine with count kinds because the other type of kinds (i.e. mass kinds, like the water-kind) do not have atoms.

This kind approach to Mandarin nouns is the one pursued in this paper. Regarding how exactly classifiers function as a "mediator" between a numeral and a noun, building on Krifka's (1995) analysis, we propose that all classifiers can be viewed as binary functions that take a kind and a numeral to yield a (quantized) property or an entity. In particular, individual classifiers enable count kinds to combine with numerals, whereas other types of classifiers enable both count kinds and mass kinds to combine with numerals. That is to say, numerals can be viewed as one of the two semantic arguments of classifiers. Here is an illustration with both individual and measure classifiers.

(52) a. Structure of numeral classifier phrases

    NumP($f_\exists$)   {Cl, NP}
      san

            Cl   NP
            ge   *ren*
            bang   *yintao*
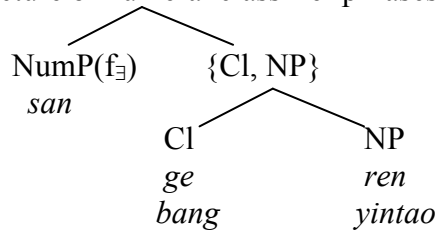
  b. Semantics of Individual classifiers
    i. *san*   *ge*   *ren*
       three   Cl$_{individual}$ man
       'three men'
    ii. [[*ren*]] = man $<e>$
    iii. three$_{<<e,t>,<e,t>>}$ = λP [three$_{<<e,t>,<e,t>>}$ (P)], or $<<e,t>, <e,t>>$
        three$_{<<e,t>,e>}$ = λP [$f_\exists$ (three$_{<<e,t>,<e,t>>}$ (P))], $<<e,t>, e>$
    iv. [[*ge*]] = λkλn [n (AT($^\cup$k))] $<e, <n,e>>$ or $<e, <n, <e,t>>>$
    v. [[three *ge* ren]] = three (AT($^\cup$man)) = [three(AT($^\cup$man))], or $<e,t>$
                                        = $f_\exists$ (three(AT($^\cup$man))) $<e>$

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c. Semantics of Measure classifiers

    i. *san   bang   yingtao*
       three Cl_{pound} cherries
       'three pounds of cherries'

    ii. [[*yingtao*]] = cherry $<e>$

    iii. [[*bang*]] = $\lambda k \lambda n$ [n (λx [$^{\cup}k(x) \wedge$ pound (x)])]] $<e, <n,e>>$ or $<e, <n, <e,t>>>$

    iv. [[*san bang yingtao*]] = three ($\lambda ^{\cup}$cherry(x) $\wedge$ pound (x))
                              = [three ($^{\cup}$cherry(x) $\wedge$ pound (x))], or $<e, t>$
                              = $f_{\exists}$(three ($^{\cup}$cherry(x) $\wedge$ pound (x))) $<e>$

In (52biv), *AT* can be understood as a relation between numerals and atomized noun denotations; it atomizes count kinds and turns them into sets containing singular *atoms* and enables the numeral *san* 'three' to combine with them (52bv). 'Atoms' can be simply defined in the traditional way: as definite singular count nouns (e.g. *the desk*, *the concept*) which are relevant only to the plural domain but not to the mass domain (e.g. Link 1983).[15] The proposed analysis of individual classifiers *ge* in (52) can be extended to other types of classifiers. For instance, in (52c), the measure classifier *bang* 'pound' combines with the count kind *yingtao* 'cherry', yielding a property of 'cherry' measured in pounds (52ciii); this newly created properties which contains countable atoms/groups allows the numeral to combine with them (52civ).

    One immediate consequence of the above approach is that if nouns in a language are kind-referring of type <e>, they can be freely argumental, and we expect no restriction on bare arguments in this language whatsoever. We also expect a series of interpretations of bare arguments in this language derived from kinds, in the same ways as English bare plurals derive their different interpretations as we assume in Section 3.2.1, (see also Yang 2001; X. Li 2011; Jiang 2012). Very importantly, this is a one-way implication: it does *not* mean that "only if nouns refer to kind, then we can get bare arguments". In particular, if nouns are *not* kind-denoting and a language freely allows bare arguments, there might well be a necessity of a D for kind reference in this language (e.g. a null D in Longobardi 1994) or of something that does the role that D does (e.g. a type-shifting operation in Chierchia 1998). For instance, Russian, Hindi, and most Slavic languages freely allow bare singulars and bare plurals in argument position, and some Germanic languages like English also allow bare plurals to freely occur as arguments, but it does not mean that nouns in these languages denote kinds. Instead, nouns in these languages have been widely argued to be property-denoting, and some syntactic operation like a null D or semantic operation has been proposed to turn these nouns into arguments (Progovac 1998; Dayal 2004; Chierchia 1998; Bošković 2005 et seq, a.o.).

    Besides the above consequence, the kind approach to nouns makes a specific and very simple prediction about ClLs, namely that a ClL with overt article determiners in

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[15] Or, assuming that the mass domain and the plural domain both contain atoms and only differ in whether they contain minimal stable atoms (i.e. in the mass domain (e.g. *water*), one cannot define the minimal stable atoms; however, atoms can be well defined in the plural domain (e.g. *apples*)) (Chierchia 2010), the atoms checked by individual classifiers can be defined as the minimal stable ones, and these atoms are still populated the denotations of definite singular count nouns, as in the traditional view. The proposed atomic checking by individual classifiers is compatible with both views of atoms.

which nouns cannot freely occur bare as arguments (analogue of English/Italian/French) should not exist. This is so because bare nouns in ClLs are inherently argumental and are always freely allowed as bare arguments. On the contrary, if nouns in ClLs always enter grammatical computations as properties, first it does not give us a clear picture of what classifiers are doing, and second, given the conclusion that most people are reaching, namely that the mass-count distinction is present at the lexical level or some pre-syntactic level, one might expect there to be ClLs that disallow (certain kind of) bare arguments. In particular, there ought to be ClLs like French that always disallow bare arguments, or ClLs like English that disallow singular count nouns as bare arguments. Nevertheless, so far as we know, this does not happen in any classifier languages, and the kind approach has a good story for this, one that is consistent with the fact that the mass-count distinction is present, say, in Mandarin. It of course remains to be seen whether this prediction is borne out as ClLs are investigated further.

Note that, Chierchia (1998) has a proposal which is based on similar logic, but he speculates that since nouns in ClLs are argumental ([+arg, -pred] in his term), there is never any need for D in the grammar of these languages on economy grounds. Chierchia's speculation might well be what explains why overt article Ds are so rare in ClLs. However, it cannot be the whole story for the following reasons. First of all, Yi does have an overt lexical definite determiner *su* 'the' as we saw in Section 3. Second, the logic of the framework itself foresees nominal structures that are property-denoting of type <e,t>, namely the {NumP, {Cl, Noun}}construction and the{Cl, Noun} construction. If a structure is of type <e, t> in ClLs, in principle, article Ds may well develop to turn it into arguments. So in other words, we can retain the idea that ClLs do not have much functional pressure to develop a D in their grammar on the one hand, but avoid concluding that therefore there cannot be any D in these languages on the other.
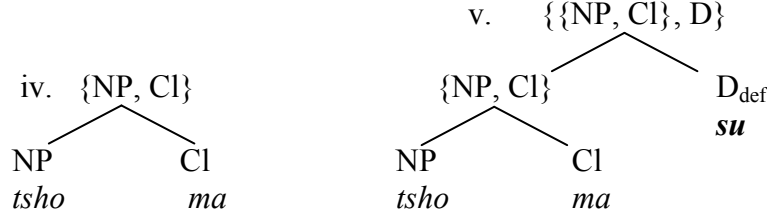
This fairly small modification of Chierchia's framework allows us to make a further prediction: if a ClL develops an article determiner, it will apply only above the classifiers, i.e. at the level of NCs which is property-denoting, and not at the level of bare nouns, which is kind denoting, given the plausible assumption that article determiners are universally property seeking functions. If an intermediate projection between NCs and bare nouns that is of type <e,t>, namely bare ClPs, is available, the article determiner can apply at this level as well. This is precisely what happens in Yi, as repeated in (53) and illustrated in (54).

(53)   a. *tsho   nyip ma* b. *tsho   nyip ma su*   c. *tsho   ma* d. *tsho   ma su* (Yi)
        person two Cl   person two Cl SU   person CL   person CL Su
        'two persons'   'the two persons'   'a person'   'the person'
    e. **tsho   su*
      person   SU

(54)   a. D cannot apply at bare noun level   (Yi)
      i. [[tsho]] = person   <e>
      ii.   {NP, D}   → composition cannot proceed, type-mismatch
              NP<e>   D$_{def <<e, t>, e>}$
              tsho   *su*

b. D can apply at bare ClP level

i. $[[ma]] = \lambda k\lambda n[n\ (AT(^\cup k))]$ *or* $\quad\quad$ $<e, <n,<e,t>>>$

$\quad = \lambda k[n\ (AT(^\cup k))]$ $\quad\quad$ $<e, <e,t>>$

ii. $[[tsho\ ma\ su]] = \iota\lambda x\ [one\ (AT(^\cup person))]$ $\quad$ $<e>$

v.　{{NP, Cl}, D}

iv.　{NP, Cl}　　　　　　{NP, Cl}　　D$_{def}$
　　　　　　　　　　　　　　　　　　　　　su

NP　　　Cl　　　　NP　　　Cl
tsho　　*ma*　　　*tsho*　　*ma*

c. D can apply at NC level

i. Numeral$_{<<e,t>,<e,t>>}$ $= \lambda P\ [n\ (P)]$ *or* $\quad\quad$ $<<e,t>,<e,t>>$

$\quad = \lambda P\ [f_\exists\ (n\ (P))]$ $\quad\quad$ $<<e,t>,e>$

ii.$[[tsho\ nyip\ ma]] = two\ (AT\ (^\cup person))$ *or* $\quad$ $<e,t>$

$\quad = f_\exists(two(AT(^\cup person))$ $\quad\quad$ $<e>$

iii. $[[tsho\ nyip\ ma\ su]] = \iota\lambda x\ [two\ (AT\ (^\cup person))]$ $\quad$ $<e>$

v. {{NumP, {NP, Cl}}, D}

iv.　{NumP, {NP, Cl}}　　　　　　　　D$_{def}$
　　　　　　　　　　　　　　　　　　　　　su

NumP　　{NP, Cl}　　　NumP　　{N, Cl}
nyip　　　　　　　　*nyip*

NP$_{<e>}$　　Cl　　　　NP　　Cl
tsho　　*ma*　　　*tsho*　　*ma*
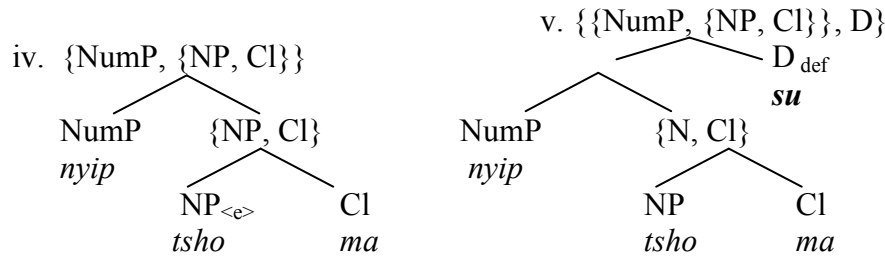
In (54a), when the kind denoting noun *tsho* 'person' merges with the property-seeking determiner *su*, a type mismatch arises, leading to a semantic compositional failure; this explains why bare nouns cannot combine with *su* in Yi (53e). In (54b), the individual classifier *ma* turns the kind-referring bare noun into a property, allowing D to apply at this level (the details of bare ClPs will be discussed in the next sub-section). Syntactically, Yi is head final in both clausal domain and nominal domain (Hu 2002; Liu and Gu 2011; Jiang and Hu 2010, 2013; Jiang 2012); in (54b), the Cl head *ma* and the D head *su* both appear in nominal final position, yielding bare ClPs [Noun Cl] and su phrases [Noun Cl su] in Yi (53c, d). In (54c), the numeral *nyip* 'two' combines with {NP, Cl} phrase, yielding a property or an entity (54cii); when the NC denote property, D can apply at this level as well (54ciii). When the NC is indefinite, it is D-less across language, as argued in Section 3.2.2. In (54civ), the numeral, which is analyzed as phrasal, occupying the Spec position of ClPs across ClLs in Section 3.3, precedes the noun *tscho* [NumP NP Cl], but in the surface order, the noun precedes the numeral [NP NumP Cl] (53a). The observed word order can be derived through multiple mechanisms, details of which can be found in Jiang (2012: 335-337). What's important for our purposes is the base generated position of these elements.

In addition to the above two predictions, we further expect that ClLs with overt article Ds should behave like Yi and share these properties: their Ds cannot combine directly with bare nouns but can only apply at higher nominal levels which are property

denoting. But whether or not this prediction is true across all ClLs remains to be seen and be justified by future studies.

Regarding Mandarin, its bare nouns and indefinite NCs are the same as those in Yi which are inherently argumental, so it is no longer necessary to assume a covert functional category D in order to account for the behavior of its nominal arguments. This is arguably a simpler and more elegant analysis of Mandarin nominals since it avoids stipulating the presence of invisible projections that otherwise have no overt manifestation in this language. Hence, bare nouns and NCs in Mandarin, according to our analysis, are both D-less (55).

(55)   Mandarin bare nouns and NCs: *D-less*
         i. Bare nouns
                 $NP_{<e>}$ $\rightarrow$ argumental
                     |
                     N
         ii. NCs
         a. $\{n, \{Cl, NP\}\}_{<e,t>}$ $\rightarrow$ predicative   b. $\{n, \{Cl, NP\}\}_{<e>}$ $\rightarrow$ argumental (indefinite)

         NumP   NumPf∃
         $n_{<et,et>}$ $Cl_{<e, <n, <e,t>>>}$ $NP_{<e>}$ $n_{<et,e>}$ $Cl_{<e, <n, e>>}$ $NP_{<e>}$

To summarize, in this sub-section we developed an analysis of the internal structure and semantics of NCs in ClLs. We argued for the view that nouns in ClLs are kinds and that there can be mass kinds and count kinds, depending on whether or not the instances of the kinds are atomic. The kind approach, as we showed, provides a natural account for the obligatory existence of classifiers in ClLs. We proposed that all classifiers can be viewed as binary functions that take a kind and a numeral to yield a (quantized) property or an entity. An immediate consequence following this kind approach is that nouns in kind-denoting languages are freely argumental. Our analysis further makes a series of predictions regarding ClLs. Specifically, we showed that a fairly small modification of Chierchia's (1998) setup makes certain interesting prediction about article Ds in ClLs and also accommodates facts from Yi in a predictable manner. All in all, the analysis developed in this section accounts for the three similarities between Yi and Mandarin shown in Section 2.1. In the following sub-section, we will illustrate how the differences between these two languages are accounted for.

4.2   Parameters of ClLs: how Yi and Mandarin differ

The differences between Mandarin and Yi, as we propose, can be reduced to two main parameters: (i) Yi has a process that derives bare ClPs in an unrestricted manner, perhaps via a lexical 'intransitivization' process (INTR) for classifiers, but Mandarin doesn't; (ii) Yi has an lexical D while Mandarin doesn't. These two parameters may be linked in certain ways, and we remain agnostic as to how they could be related. Regarding these two parameters, the second one [±lexical D] is quite straightforward, but the first one [±Cl_{INTR}] requires some elaboration, which we provide below.

As shown in (52), the universal use of classifiers is the 'transitive' one, i.e. classifiers have two semantics arguments and obligatorily require a noun and a numeral in their semantics in order to complete a *numeral-taking* classifier phrase {n, {Cl, NP}}. In order to derive *numeral-less* bare ClPs {Cl, NP} (a variable property attested only in *some* ClLs), certain operation becomes necessary to 'remove' one of the two 'arguments' (i.e. the numeral) from the classifiers. Below, we consider two such processes.

Mandarin allows bare ClPs in a rather limited distribution (e.g. in a position immediately following a verbal element or a stressed nominal element, c.f. Lü 1944), as we saw in (14); this can be the result of a process that applies in a *restricted* form, perhaps via a *one*-deletion rule along the lines first pursued in Lü 1944 (and elaborated in Chao 1968; Li 1997; Borer 2005; Huang 2009; Jiang 2012; Li and Feng 2013, a. o.).[16] What this *one*-deletion analysis implies is that bare ClPs in Mandarin are *not* really bare in the syntax, i.e. they have the structure {one, {Cl, NP}}, and eliding *one* during the process of externalization simply results in a prima facie bare form of the ClPs {~~one~~, {Cl, NP}}. As for the semantic difference between the prima facie bare ClPs {~~one~~, {Cl, NP}}and NC {one, {Cl, NP}}, it lies in that the former cannot be used in contrastive or focused environments where the information conveyed by the numeral *one* is stressed/important (e.g. Lü 1944, Li and Bisang 2011).[17] This difference can be viewed as the semantic condition for eliding *one*. Except for this difference, Mandarin numeral-less ClPs and numeral-taking ClPs do share two main interpretations: the narrow scope existential reading (i.e. the GQ reading) (e.g. Cheng and Sybesma 1999, Li and Bisang 2011) and the long-distance scope reading (i.e. the CF reading) (e.g. Jiang 2012). We illustrate this *one*-deletion analysis of Mandarin bare ClPs below.

(56)   *One*-deletion, deriving bare ClPs in Mandarin (applied in a restricted way)
  a. *mei ge youke dou bei (yi) ge nvhai-r huyou mai le yi bu shouji.*
   every Cl vistor all   Pass one Cl girl hoodwink buy Asp one Cl cell-phone
   'Every tourist was hoodwinked to buy a phone by a girl.'[a girl > ∀], [∀ > a girl]
                   (Jiang 2012:184, ex (153))
  b. Syntax   c. PF
    {yi, {ge, nvhai-r}}   →   [~~yi~~ ge nvhai-r]
   NumP
    yi
        Cl   NP
        ge *nvhai-r*

---

[16] Cheng and Sybesma 1999, Li and Bisang 2011, and Cheng et al 2012 provide arguments against the *one*-deletion view of Mandarin bare ClPs first proposed in Lü 1944, but see Li 1997, Borer 2005, Huang 2009, Jiang 2012, and Li and Feng 2013 for arguments in favor of the *one*-deletion approach.
[17] Two examples to illustrate the difference between numeral-less ClPs and numeral-taking ClPs in Mandarin are given in (4) in which the numeral *one* cannot be omitted.
(2) a. *you *(yi) ge xuesheng, wu ge chefu.*
  have one Cl student five Cl carter
  'There is a student and five carters'   (Lü 1944: 167, with slight modification)
  b. *wo hua le *(yi) ge xiaoshi chifan*
  I spend Perf one Cl hour eat-meal
  'I spent one hour eating a meal.'   (Li and Bisang 2012: 345, ex (18))
This difference has a straightforward explanation, namely that in contrastive/focused environment, contrastive/focal stress is required; however, null elements are destressed.

d. Semantics of bare ClPs: [~~one~~ Cl N] = [*one* Cl N]

   i. [[~~one~~ Cl N]] = λP∃f [P (f (λx one (AT($^\cup$k))(x)))] elided *one* → GQ reading

   ii. [[~~one~~ Cl N]] = f∃(λx[one (AT ($^\cup$k))(x)])   elided *one* → CF reading

The *one*-deletion analysis also logically explains why Mandarin bare ClPs {Cl, NP} can only be interpreted as singular but rather 'two', 'three', or 'some': since it is 'one' that is deleted from [*one* Cl-N], the [Cl- N] phrase can only be interpreted as singular one (C.-T. James Huang p.c.). With respect to the distribution of bare ClPs in Mandarin (e.g. (20)), it could be viewed as the result of some phonological restrictions (e.g. Lü 1944, Jiang 2012; Li and Feng 2013). Regarding the the phonological conditions and the prosodic liscensing conditions for the deletion of *one* in Mandarin, we refer the readers to Lü (1944) and Li and Feng (2013).

   Turning to Yi, it allows *unrestricted* bare ClPs (i.e. bare ClPs can appear in any argument position) (e.g. (16)); this could be due to a process that derives them in an unrestricted manner, perhaps via a *lexical* 'intransitivization' process (INTR) for classifiers, as illustrated in (57).

(57)   Lexical Rule *INTR*, deriving bare ClPs in Yi (applied in unrestricted way)[18]

   a. Cl = λkλn [n(AT($^\cup$k))]   *or*   = λkλn[f∃(n(AT($^\cup$k)))]

   b. if α∈ Cl, λkλx [Cl (one)($^\cup$k)(x)] ∈ Cl_INTR

   c. Cl_INTR = λkλx Cl_Intr (one)($^\cup$k)(x) = λkλx [one(AT($^\cup$k))(x)]

   d.

        ClP$_{<e,t>/<e>}$

       ╱‾‾‾‾‾╲   *INTR*
   NumP   ClP   →   e.   Cl_INTRP$_{<e,t>}$ = λx [one(AT(P))]
   $n_{<et,et>/<et, e>}$ ╱‾‾‾╲   ╱‾‾‾╲
              NP$_{<e>}$ Cl$_{<e, <n, et>>/<e, <n, e>>}$ NP$_{<e>}$ Cl$_{INTR<e, et>}$

The lexical rule in (57) removes one of the semantic arguments, i.e. the numeral *n*, from the classifiers, yielding 'intransitive' classifiers. The availability of INTR is to be considered as a parameter [±Cl_INTR], which a language may or may not have. The lexical rule accounts for the variable property of ClLs, explaining why some languages permit bare CLPs (e.g. Yi) but some don't (e.g. Japanese, Korean). [19]

   After an intransitivized classifier merges with a noun, the structure in (57iiie) creates property-denoting nominals. In order to achieve the freely argumental use of the classifier-noun phrase {Cl, NP} in Yi (e.g. (16)), this property-denoting nominal can be turned into an argument via whatever device available in the language. Such a device can be an overt article D attested in this language, a covert D in the syntax (Borer 2005), a

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[18] It might be appealing to propose another analysis for bare ClPs in Yi: unlike Mandarin, Yi allows *one*-deletion everywhere given that `one' is sandwiched between N and CL in Yi, that is, what comes immediately before the nominal in Yi does not matter, because that element is not adjacent to the numeral `one'. However, such an analysis, although also applicable to Bangla, will not apply to other ClLs like Cantonese, i.e. its numerals precede both N and Cl, but bare ClPs are also freely allowed.

[19] As a reviwer pointed out, this metaphor of 'Intransitivization' is not a good one since in our cases it is the numeral 'the external argument' that is removed but in the real intransitivization case, it is always the internal argument that is removed.

type-shifting operation in the semantics (Dayal 2004, 2010), or a combination of a covert D and type-shifting in the semantics(Chierchia 1998). Both covert Ds in the syntax and type-shifting in the semantics are *covert* argumentizing operations, which we refer to as ARG. The two covert operations are shown below.

(58)   a. Syntactic Projection   **or**   b. Semantic Type-Shifting

              DP$_{null}$ **ARG** (NP$_{<e, t>}$)

     D   NP$_{<e, t>}$

   ARG

For simplification purposes, we here use the Chierchia-Dayal style account to illustrate how property-denoting {Cl, NP} phrases in Yi are argumentized and how their interpretations are derived, as illustrated in (59).

(59)   Argumentizing {Cl, NP} in Yi
     a.   [[NP CL **su**]] = ι λx [one(AT(P))]
     b. If {Cl, NP} is argumentized covertly via ARG, it can only be indefinite since:
        i. ARGι {Cl, NP} = blocked by the presence of *su*
        ii. ARG$^{\cap}$ {Cl, NP} = undefined for singular properties
        iii. ARG f$_{\exists}$ {Cl, NP} = indefinite

In (59a), the overt definite determiner *su* can turn {Cl, NP} into arguments with a definite interpretation. In addition to overt operations like lexical article determiners, {Cl, NP}, in principle, can be turned into arguments covertly with a definite, kind, or indefinite interpretation due to *Rank of Meaning* in Chierchia (1998) and Dayal (2004). Nevertheless, the two covert options, i.e. definite and kinds, are unavailable for the following reasons. First, the presence of an overt definite article *su* in Yi blocks the possibility of turning Yi bare ClPs covertly into arguments with a definite reading (the *Blocking Principle*, see Chierchia 1998) (59bi). Second, turning {Cl, NP} to kinds is undefined because the semantics of singularity of {Cl, NP} clashes with the conceptual notion of a kind which corresponds to the plurality of all instances of the property (e.g. Dayal 1992) (59bii). Accordingly, the only possibility left, according to *Ranking of Meanings*, is to turn {Cl, NP} covertly into arguments with an indefinite reading (59biii). This indeed is what happens in Yi: its bare ClPs are indefinite only (e.g. (16)).

       In addition to the above consequence, we expect a series of further consequences to follow from the proposed analysis of NCs, which we will address in Section 5.

5   Further consequences and future vistas

5.1   Definites and demonstratives

       The first additional consequence concerns the interpretations of bare nouns in ClLs, especially the definite interpretation. We illustrate this with examples from Mandarin in (60a-c).

(60)　Deriving the interpretations of bare nouns in Mandarin
　　　　a. _konglong miejue le_.　b. Mali pa　_gou_.　　c. _wo kanjian gou le._ (Mandarin)
　　　　　　dinosaur extinct Asp　　Mali afraid dog　　　I　see　　dog Asp
　　　　　　'Dinosaurs are extinct.' 'Mali is afraid of dogs.' 'I saw dogs/the dog(s).'
　　　　d. [[_konglong miejue le_]] = extinct (dinosaur)
　　　　e. [[_Mali pa gou_]]　= Gen x [$^\cup$dog(x)] [be afraid of (Mali, x)]
　　　　f. [[_wo kan jian gou le_]] (via DKP) = $\exists e \exists x$ [$^\cup$dog(x) $\wedge$ see$_w$ (e, I, x)]
　　　　g. [[_gou_]] = [dog$_{<e>}$]s = $\lambda s'$dog$_{S'}$ (s) = the maximal member instantiating dog-kind
　　　　　　　　　　　　　　　　　　　　　　　　　in a situation s

Given that bare nouns in ClLs are kinds, they can take kind-level predicates directly (60d), they can receive a generic interpretation by restricting the generic operator in generic sentences like what bare plurals do in English (as discussed in Section 3.2.1) (60e), and they can also undergo DKP (Chierchia 1998) to derive a narrow scope existential reading in episodic sentences (60f). The only interpretation of bare nouns in Mandarin and Yi left unexplained is the definite one. This reading, as we propose, might be obtained by plugging into the kind a situation variable, provided by the context (60g) (see also Trinh 2010 and Dayal 2011a, 2012 for proposals along the same lines). From here on, let _Situation Restriction_ (SR in short) refer to this strategy, as shown in (61).

(61)　_Situation Restriction_ (SR)
　　　　[N$_{<e>}$]$_s$→ [N$_{<ei>}$] = the maximal member instantiating N-kind in a situation _s_

Since kinds are functions from situations to (possibly plural) individuals (e.g. see Chierchia 1998b: 349), by applying them to a 'resource' situation (an analogue of Domain Selection, see von Fintel 1994; Elbourne 2001) we get a situation restricted individual e$_i$. SR, then, can be viewed as a function from kinds to situation restricted kinds, type <e, e$_i$>. It restricts a kind to a specific situation and obtains the _maximal_ members in that situation provided by the context. In a sense, SR is analogous to the iota operator (ι), the canonical Frege-Russell definition of which is 'the largest member of X if there is one (else, undefined)' (c.f. Chierchia 1998b: 346 and see Sharvy 1980 for the same analysis for the definite determiner in English). (One might also note that reference to the maximal sum in a situation here plays a role similar to reference to stages in Carlson's 1977 theory.) [20] What (60) and (61) show is that the different interpretations of bare nouns in ClLs can be derived from their kind reading, including the definite one, without additional stipulations. Next, we move on to discuss the second consequence regarding demonstratives (Dems).

　　　　In Yi, both Dems and the determiner _su_ combine _only_ with higher nominal projections (ClPs and above) (62a, a', b, b') and _never_ combine with bare nouns (62c, c'). In contrast, Dems in Mandarin can freely combine with higher projections (63a, b) as well as bare nouns (63c).

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[20]Note that there could be a number of ways of obtaining definiteness from kinds. SR is one such way, so is a new type of iota of type <ek, e> which directly gives rise to the definiteness of kind-referring bare nouns. However, they are both the same idea, and the 'new iota' will be undistinguishable from the situation restriction that we proposed.

(62) a. *tsho __tshɿ__ ma* b. *tsho __tshɿ__ nyip ma* c. **tsho __tshɿ__* (Yi)
      man this Cl   man this two Cl   man this
      'the man'   'these two men'

      a'. *tsho ma __su__* b'. *tsho nyip ma __su__* c'. **tsho __su__*
          man Cl the   man two Cl the   man the
          'the man'   'these two men'

(63) a. *__zhe__ ge ren* b. *__zhe__ liang ge ren* c. *__zhe__ ren* (Mandarin)
      this Cl man   this two Cl man   this man
      'this man'   'these two men'   'this man'

The contrast between the behaviors of Dems in Yi (62a-c) and those in Mandarin (63a-c) leads to the question of whether the alternation is a relative 'local' form of syntactic variation or whether it reveals something deeper about the difference between article determiners and demonstratives. We will propose that the latter is the case: article determiners are universally property-seeking functions; whereas Dems can be either property-seeking functions or kind-seeking functions with indexically individuated situations, as illustrated in (64a) and (64b) respectively.

(64) $this_n/that_n$ denotes a (distal) situation that the speaker is pointing at
      a. $this_n/that_n$ (P)(x) = P(x) $\wedge$ x is in $this_n/that_n$
      b. $Kthis_n/that_n$ = $K(this_n/that_n)$ = the manifestation of K in $this_n/that_n$

In particular, the same strategy to derive definites from kinds via SR, plus an indexical component, can be exploited to obtain the definite reading for {Dem, NP} in Mandarin. For example, if the cat-kind c is a function from situations s to the maximal entity that instantiates c in s, *zhe mao* '*this cat*' in (65a) can be represented as $c(this_n)$, where $this_n$ denotes the (distal) situation the speaker is pointing at (65b).

(65) a. *wo xihuan #(__zhe__) mao bu xihuan #(__zhe__) mao.* (Mandarin)
      I   like   this cat not like   this cat
      i. 'I like this cat but don't like this cat.'
      ii. '#I like the cat but don't like the cat.'
      b. [[zhe mao]] = [$cat_{<ek>}$] ($this_n$) = the manifestation of c in $this_n$ $<e>$

The difference between {Dem, NP} and bare nouns in Mandarin in (65a) is similar to that between demonstratives and determiners in terms of their semantic contents (65ai) and (65aii): the former is linked to an action of demonstration which produces an extra content to 'definiteness', whereas the latter lacks this act of demonstration.

Regarding the structural position of Dems, Dems and article determiners have been assigned to the same position in the head of DPs (e.g. Jackendoff 1977). This analysis captures the fact that in languages like English article determiners and Dems cannot co-occur. Despite the fact in English, many authors have argued that Dems and article determiners do *not* occupy the same structural position (Giusti 1997, 2002; Brugé 2000, 2002; Brugé and Giusti 1996; Panagiotidis 2000; Grohmann and Panagiotidis

2005; Shlonsky 2004; Alexiadou et al 2007, a.o.). One of their arguments for distinguishing Dems from article determiners is that in many languages, such as Spanish, Romanian, Hungarian, and Greek, the two elements can co-occur. These authors further argue that Dems are base-generated in a lower position between NP and DP and undergo movement to a higher position, e.g. Spec, DP. In this paper we adopt the analysis argued for by the above authors and assume that Dems do not occupy in same position as article determiners but occupy the specifier position in the nominal domain. Regarding what position Dems exactly occupy in ClLs, what the examples in (62) and (63) suggest is that Dems in Mandarin can apply at different structural levels which are of different semantic types (properties or kinds) (66a) but Dems in Yi can apply at different structural levels that are property-denoting only (66b) (with optional phrases/heads in parenthesis).

(66)   a. Mandarin $<e>$ b. Yi[21] $<e>$

$\text{Dem}_{<et, e>/<e,e>}$ $(\{n, \{Cl, NP\}\}_{<e, t>})$ $\text{Dem}_{<et, e>}$ $(\{n, \{Cl, NP\}\}_{<e, t>})$

$(\text{NumP}_{<et, et>})$ $(\{Cl, NP\}_{<e, t>})$ $(\text{NumP}_{<et, et>})$ $\{Cl, NP\}_{<e, t>}$
       n n

$(\text{Cl}_{<e, <n,et>>})$ $\text{NP}_{<e>}$ $\text{NP}_{<e>}$ $\text{Cl}_{<e, <n,et>>}$

The analyses of definite bare nouns and demonstratives above not only reveal a fundamental difference between article determiners and demonstratives, but also show that whether or not a ClL has overt Ds does not change the availability of the definite reading of its bare nouns.

        In addition to the above two consequences, our analysis of ClLs has one additional consequence concerning language variation in ClLs with respect to the definite reading of their bare nouns, which will be discussed in Section 5.2.

5.2. Language variation regarding definite readings of bare nouns
        Although ClLs with 'real' article determiners are rare, there are several ClLs where definiteness is somehow overtly marked. Particularly prominent cases are Cantonese (to pick another Sino-Tibetan language) and Bangla (to pick a typologically unrelated Indo-European language). As is well known, in Cantonese, bare ClPs constitute the canonical way to convey the definite interpretation of a nominal (Cheng and Sybesma 1999, 2005), as shown in (67a).

(67)   a. *bzek gau zungji sek juk.*   (Cantonese)
          CL dog   like   eat meat
          'The dog likes to eat meat.'
           (not: dogs like eating meat)   (Cheng and Sybesma 1999: 511 (6a))
        b. *boi   ta*   (Bangla)
          book CL
          'the book'   (Dayal 2011b: 3, (12a′))

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[21] The linear order can be fixed either in the narrow syntax, e.g. via moving NP to the nominal initial position, or in the PF, e.g. some phonological rules require nouns to be pronounced in the nominal initial position in Yi.

Similarly, as illustrated in (67b), definiteness is also marked by bare ClPs (with inverted word order with respect to the basic one) in Bangla (e.g. Bhattacharya 1999a, b; Dayal 2010, 2011b, 2012a, b).[22] Interestingly, in both languages, bare nouns generally do not receive a definite interpretation (see Cheng and Sybesma 1999 for Cantonese and Dayal 2011b, 2012a, b for Bangla). An example from Cantonese is provided in (68).

(68)   *Wufei   jam-jyun   *(wun) tong la.*   (Cantonese)
        Wufei drink-finish   CL   soup SFP
        'Wufei finished drinking the soup.'   (Cheng and Sybesma 1999: 510 (3b))

What this suggests is the following generalization: definiteness marking of the type found in Cantonese/Bangla is seemingly mutually exclusive with the definite use of the bare noun, whereas the presence of the overt definite article in Yi is compatible with a definite interpretation of bare nouns. However, as observed in Wu and Bodomo (2009) and Simpson et al (2011), if certain salient contexts are available, bare nouns in Cantonese and Bangla can be used refer to the unique entity in the context, i.e. they can be definite. While we may not have a final account of this phenomenon, we sketch out two tentative explanations below.

The first account assumes that *SR*, which shifts kind-referring bare nouns to definites (as proposed in Section 5.1), is *not* universally available in ClLs. A ClL that lacks this covert operation on its bare nouns, then, needs to develop some overt counterparts of that operation to express definiteness. That is what the bare classifier-noun construction {Cl, NP} does in Cantonese or the movement does in Bangla. On the other hand, if a ClL does have *SR*, it may or may not further develop an overt way to express definiteness. For instance, Yi has both *SR* and an overt definite determiner, whereas Mandarin only has *SR* but no overt definite determiner, overt movement or bare ClPs for definiteness. A crucial thing of this story is that the overt operation to express definiteness further developed in ClLs (e.g. the overt definite D) and *SR* on bare nouns do *not* compete and that their coexistence is *not* conflicting. This is so because the two operations apply at different structural levels in the nominal domain (i.e. higher nominal levels *vs.* the lowest nominal level) and are functions of different types (e.g. $<<e,t>, e>$ *vs.* $<e_k, e>$).

The above story assuming that *SR* is not universally available would predict that the definite interpretation of bare nouns will be banned in ClLs like Cantonese and Bangla since they lack this option in their grammar. It does explain cases like the one in (68); however, this prediction is too strong in the sense that it excludes all the possibilities of using bare nouns in these two language for definiteness. According to the above story, cases that allow bare nouns to express definiteness in these two ClLs as observed by Wu and Bodomo (2009) and Simpson et al (2011) would require other explanations.

The second account, alternatively, assumes that *SR* is universally available and that some independent factor blocks *SR* from applying to bare nouns in some ClLs, e.g. some modified version of *Blocking Principle* in Chierchia (1998). *Blocking Principle*

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[22] The order [NP-Num-Cl] might not be the basic order of Bangla numeral-containing phrases (see Bhattacharya 1999a, b and Dayal 2010, 2011b, 2012b for analyses of Bangla nominal structures).

("Type Shifting as Last Resort") concerns overt lexical Ds; it states that if an overt determiner D which can shift any set X in its domains is available, then use of any covert type-shifting operation τ on that X that achieves the same effects is blocked (Chierchia 1998: 360). For example, type-shifting 'dog' covertly to an argument with a definite interpretation in English is blocked (i.e. *τ(dog)) since an overt definite D 'the' is available, i.e. the(dog). Along this line, let us assume that ClLs may develop on top of *SR* any *covert* type-shifting operation that turn properties to arguments (a null D in the syntax or a type-shifter in the semantics), namely ARG, and that this ARG can be viewed as the counterpart of SR; then we generalize *Blocking Principle* to *SR* and ARG, even though they are not of the same type. In particular, we propose a 'soft competition' between the two covert operations, as formulated in (69).

(69)   *Soft Competition* between two *covert* operations
        For *SR* and any α
        * SR (α)
    if there exists a ARG such that for any {β, α} in its domain that β turns any kind-referring α to proprieties,
        ARG ({β, α}) = SR (α)

The above blocking principle states that the covert operation *SR* that turns any kind-referring α to definites will be blocked if there exists a covert operation ARG that can turn a *larger* phrase {β, α} which is property-denoting into an argument with a definite interpretation. Under the second assumption, Cantonese and Bangla will be ClLs with ARG applying to their bare ClPs {Cl, NP}, while Mandarin will be ClLs that lack the operation ARG.

A crucial element in (69) is that the two competing operations are not of the same type: *SR* applies to kinds, type <e_k, e_i>; whereas ARG applies to properties, type <<e,t>, e>. 'Soft' here means that ARG does not block *SR* completely. The reason to consider the blocking principle in (69) a 'soft' constraint is based on the different natures of the two covert operations and the different structural levels that the two operations apply to (i.e. bare nouns versus bare ClPs). To be concrete, to place operations of different types that apply to phrases at different structural levels in a competition is not fair to begin with, thus providing some reason for the 'soft' nature of such a competition. As a weak constraint, we would on one hand expect that the bare ClP in Cantonese/Bangla is the default structure to express definiteness and on the other hand expect their bare nouns to be able to express definiteness in some circumstances. This indeed is what happens in these two languages.

As for Yi, the soft competition in (69) is not applicable. This is because Yi has an overt definite determiner *su* that shifts properties to arguments with a definite interpretation overtly. The same as the first account, we assume that no competition should be placed between an overt lexical D and *SR* because one is an overt operation that applies at higher nominal levels in ClLs and is of type <<e,t>, e> , while the other is a covert operation which only applies at the lowest nominal level (i.e. the bare noun level) and is of type <e_k, e> (70).

So far, we have seen three more consequences that follow from the proposed analysis. In the following sub-section, we will discuss possible typological investigations

that we leave for the future research; we speculate that different settings of the two main parameters that differentiate Mandarin and Yi (i.e. [±D, ±Cl$_{INTR}$]) (as proposed in Section 4.2) predict further language types, which are indeed attested.

5.3   Typological investigation for the future

As we have shown in Section 4.2, the two parameters [±D, ±Cl$_{INTR}$] captured two types of ClLs. The first type lacks the functional category D in the syntax as well as the lexical intransitivization rule for classifiers (i.e. [−D, −Cl$_{INTR}$] ClLs); this type is represented by Mandarin in which unrestricted bare ClPs are not admitted (70i). The second type of ClLs that was discussed has both the functional category D and the lexical intransitivization rule for classifiers (i.e. [+D, +Cl$_{INTR}$] ClLs), as represented by Yi (70ii). In this type of ClLs, bare ClPs are freely allowed in argument position, and Ds are only detected at the NC level and the bare ClP level. Since nothing in the theory predicts a one-to-one correspondence between the presence of D and the lexical rule of classifiers, our theory predicts that two other types of ClLs should be attested: one that does not have Ds but has the lexical rule for classifiers, i.e. [−D, +Cl$_{INTR}$] (70iii), and another that has Ds but lacks the lexical rule for classifiers, i.e. [+D, −Cl$_{INTR}$] (70iv).

(70)   Predicting ClLs with [±D, ±Cl$_{INTR}$]

	ClLs	D	Cl$_{INTR}$
(i)	Mandarin	−	−
(ii)	Yi	+	+
(iii)	?	−	+
(iv)	?	+	−

We expect [−D, +Cl$_{INTR}$] ClLs (70iii) to have three main properties. First, their bare nouns should denote kinds and behave similarly to those in Mandarin and the rest of the ClLs. Second, their NCs should behave similarly to those in Mandarin and other languages. Note that in ClLs *with* Ds, NCs have the option to shift to a definite interpretation via the definite D, as in Yi. However, in ClLs *without* D, this option is not available. Third, since this type of ClLs possesses the intransivization rule for classifiers, bare ClPs in these ClLs are expected to appear freely in argument position and receive a definite interpretation despite the absence of D (due to e.g. *Ranking of Meanings*).

As for [+D, −Cl$_{INTR}$] languages (70iv), we expect them to have the following properties. First, they have no unrestricted bare ClPs in virtue of lacking the lexical intransitivation rule for classifiers. Second, their bare nouns should denote kinds and behave similarly to those in Mandarin and the rest of ClLs. Third, their NCs should behave similarly to those in Mandarin and other languages. Fourth, since the only type of property-denoting nominal is NCs, D should be detected only at the NC level, turning NCs into arguments with a definite interpretation.

We find that Cantonese matches the properties in (70iii) and Thai matches the properties in (70iv) (see also Jiang 2012).[23] In addition, Mandarin allows *one*-deletion to apply to its NCs in a restricted manner during the process of externalization at PF. In

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[23] Relevant Cantonese examples can be found in Cheng and Sybesma 1999, 2005, Simpson 2005, and Jiang 2012; relevant Thai examples can be found in Jenks 2011 and Jiang 2012.

principle, there could be a ClL similar to Mandarin in having the [−D, −Cl$_{INTR}$] setting but different from it in disallowing *one*-deletion; we find that Korean/Japanese instantiates this type (i.e. its bare ClPs are simply banned (15)). The proposed comparative analysis of Mandarin and Yi, thus, has rich consequences for the typology of argument formation in ClLs, as summarized below.

(71)   Updated Typology of argument formation

[+D] <
    [−Cl$_{INTR}$]: Thai
    [+Cl$_{INTR}$]: Yi, Bangla

N$_{<e>}$ <

[−D] <
    [-Cl$_{INTR}$] <
        [−PF *one*-deletion]: Japanese, Korean
        [+PF *one*-deletion]: Mandarin
    [+Cl$_{INTR}$]: Cantonese
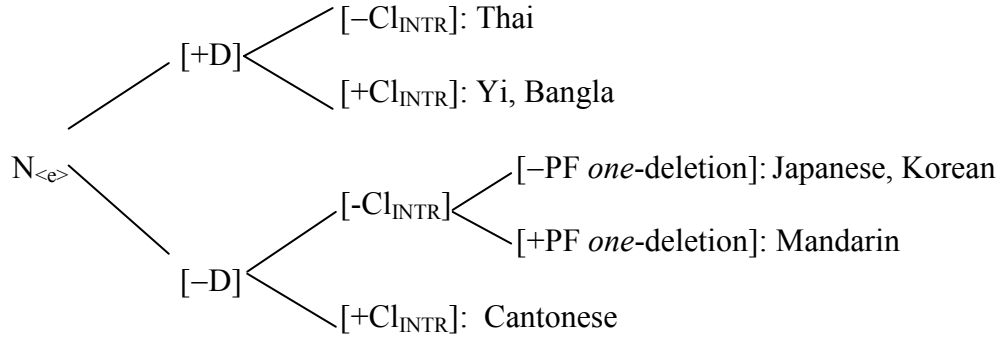
6   Summary and concluding remarks

The main purpose of this paper was to understand how nominal arguments are formed in ClLs and whether or not nouns universally require Ds when serving as arguments. We studied comparatively two types of ClLs, instantiated by Mandarin and Yi respectively and argued that Yi is a ClL with an overt definite article determiner. The comparison between Mandarin and Yi raised a series of general puzzles concerning ways of marking definiteness, behaviors of demonstratives, and the status of D.

Mandarin and Yi were further compared with NMLs like English, French, and Russian with regard to the behavior of their unmodified NCs (of the form *two boys* or *liang ge ren* 'two Cl man'). We observed that these NCs in NMLs and those in ClLs share strong similarities at the clausal level concerning their long-distance scope behavior, semantic interpretation and syntactic distributions, regardless of whether a language is a number marking one or a classifier one and whether or not it has an overt D. Based on such facts, we argued for a lexical view of numerals that treats them as ambiguous. This approach of numerals relates the predicative use of NCs to their argumental use in a systematic way; the structure of NCs, therefore, is simplified with a uniform syntax, being *D-less*, in both NMLs and ClLs.

It was further shown that NCs in ClLs are rather different from those in NMLs in the internal domain, even though their behaviors at the clause level are so similar. We argued for the view that bare nouns in ClLs refer to kind and that classifiers are relations between numerals and atomized noun denotation. Crucially, we showed that a fairly small modification of Chierchia's (1998) framework of ClLs explains facts from Yi in a predictable manner and allows us to made interesting predictions about ClLs: (i) a ClL with overt article Ds which disallow bare arguments (analogue of English/Italian/French) should not exist, and (ii) if an overt article D should develop in a ClL, it should only apply at higher nominal levels which are property-denoting, e.g. at the level of NCs which is property-denoting, and not at the level of bare nouns which is kind referring. If an intermediate projection between NCs and bare nouns that is property denoting, namely

a bare ClP, is available, article Ds can apply at this level as well. The modified framework also made a novel conjecture, namely that the development of overt article Ds in ClLs would be only allowed if they fit the same mode as Yi. It of course remains to be seen whether these predictions are borne out as ClLs are investigated further.

       Importantly, we reduced the micro-variation between Mandarin and Yi in the nominal domain to two main parameters: $[\pm Cl_{INTR}]$ in the lexicon, and $[\pm D]$ in the syntax. Mandarin was argued to be a D-less ClL which lacks the lexical 'intransitivization' process (INTR) for classifiers that derives unrestricted bare ClPs; whereas Yi was argued to be a ClL with Ds that has INTR. Our analysis, hence, provides further evidence for the view that there is variation and parameterization in the obligatory status of D (e.g. Chierchia 1998; Dayal 2004; Bošković 2005 et seq).

       We showed that a series of further consequences follow naturally from the proposed analysis of nominal arguments in ClLs. First, semantically, demonstratives can be obtained either from properties or from kinds via the help of indexically individuated situations and thus, unlike determiners, demonstratives can apply at different levels in nominal structures. Second, the same strategy (minus the indexical component) can be exploited to obtain definite readings for bare nouns. Third, language variation regarding the definite reading of bare nouns in ClLs can be explained by some competition mechanisms that apply to bare nouns and bare ClPs. Last but not least, we speculated that our two parameters, i.e. $[\pm Cl_{INTR}]$ and $[\pm lexical\ D]$ predict further ClL types that are indeed attested.

       The study of more languages with different nominal systems may lead to an essential reorganization of the current picture. For the time being, however, it seems to us that studying Mandarin and Yi comparatively has helped us to get a few steps closer to a general theory of argument formation of wide cross-linguistic applicability.

Appendix

(1)   Three additional common properties of NCs in French, Russian, Mandarin, and Yi
        (i) Property 4: Lack of anaphoric uses
        (ii) Property 5: Long-distance scope interpretation and island-escaping ability
        (iii) Property 6: Generic construal

(2)   Property 4: Lack of anaphoric use of NCs
        a. *Jean a   acheté <u>deux chiens</u> et   <u>deux chats</u>.*   (French)
          John has bought two dogs and two cats
          #(Les/ces) <u>deux chats</u> sont coûteux.
            The/these two cats are expensive
          'John bought two dogs and two cats. The/these two cats are expensive.'
        b. *Ivan kupil   <u>pjat' sobak</u> i   <u>pjat' koshek</u>.*   (Russian)
          Ivan bought five dogs and five cats.
          #(Eti)   <u>pjat' koshek</u> ochen' dorogie.
            These five cats   very   expensive
          'Ivan bought five dogs and five cats; these five cats are very expensive.'
        c. *fang-jian li   zuo zhe san ge nansheng he wu   ge nvsheng,*
          room   inside sit Prog three Cl boy   and five Cl girl

#(na)   wu   ge nvsheng hen chao-si   le.   (Mandarin)
   that/those five Cl girl   very noisy-dead SFP
   'Three boys and five girls are sitting in the room. Those five girls are so noisy.'
d. *si-hni sɔ   ma sini sse-vo sɔ   ma i go   nyi,*
    girl   three Cl and boy   three Cl   house sit,
    si-hni #(a daɣ) sɔ   ma / si-hni sɔ   ma #(su) dzi   ndʐa.   (Yi)
    girl   that three Cl girl   three Cl   SU very beautiful
    'Three girls and three boys are sitting in the house; <u>those/the three girls</u> are very

pretty.'

(3)   Property 5: Long-distance scope and island-escaping ability of NCs
         a. *Si tu   apportes <u>deux filles</u> à la   fête,   j'en serai heureux.*   (French)
            If you bring   two girls to the festival I   will   happy
            'If you bring two girls to the party I will be happy'
            i. Wide scope: [<u>two</u>> if]   [island escaping: wide scope]
            ii. Narrow scope: [if > <u>two</u>]
         a′. *La plupart des professeurs ont   lu   chaque essai que <u>deux étudiants</u> ont écrit.*
            the most of professors have read every essay that two students have written
            'Most professors have read every paper that two students wrote.'
            i. Intermediate scope: [most><u>two</u>>every] [island escaping: intermediate scope]
            ii. Narrow scope: [most>every><u>two</u>]
         b. *Ja budu   schastliv, esli ty   pridjosh' na vecherinku s   <u>dvumja devushkami</u>.*
            I   be.fut happy   if   you come   on party   with two   girls
            'If you bring two girls to the party, I will be happy.'   (Russian)
            i. Wide scope: [<u>two</u>>if]   [island-escaping: wide scope]
            ii. Narrow scope: [if><u>two</u>]
         b′. *Bol'shinstvo professorov prochitali kazhduju rabotu chto napisali <u>dva studenta</u>*
             most   professors   read   every   paper that wrote   two students
             'Most professors have read every paper that two students wrote.'
             i. Intermediate scope: [most><u>two</u>>every] [island-escaping: intermediate scope]
             ii. Narrow scope: [most>every><u>two</u>]
         c. *ruguo ni   neng dai <u>yi ge nvsheng</u> lai   wo-de party de-hua,* (Mandarin)
            if   you can bring one Cl girl   come my   party if
            wo hui   hen kaixin.
            I   will very happy
            'If you can bring one girl to my party, I will be very happy.'
            i. <u>Wide scope</u> [one girl > if] [island-escaping]
            ii. <u>Narrow scope</u>: [if > one girl]
         c′. <u>*Da-bu-fen laoshi*</u> *dou   jian-le   [<u>mei yi ge</u>*
            most   teacher DOU meet-Asp every one Cl
            [bei <u>san suo changqingteng daxue</u> luqu   le De] *xuesheng*]
             Pass three Cl Ivy League   college admit Asp de student
             'Most teachers have met every student who was admitted by three Ivy League
schools.'
            i. Intermediate scope: [most ><u>three</u>> every] [island-escaping]
            ii. Narrow scope: [most > every ><u>three</u>]

d. *ne   si-hni nyip zha shyp   ngop ddu ggep la   go-li,*   (Yi)
   you girl   two Cl bring my   home play come if,
   nga khat   ox.
   I   happy SFP
   'If you bring two girls to come to hang out in my home, I will be happy.'
   i. <u>Wide scope</u>   [two girls > if] [island-escaping]
   ii. <u>Narrow scope</u>: [if > two girls]

(4)   Property 6: Generic/individual level interpretation of NCs in NMLs
        a. <u>*Deux garçons*</u> *peuvent soulever un piano.*   (French)
           two boys   can   raise   a piano
           'Two boys can lift a piano.'
        b. <u>*Pjat' parnej*</u> *ne   mogut podnjat' pianino.*   (Russian)
           five boys   NEG can   lift   piano
           'Five boys cannot lift a piano.'
        c. <u>*san   ge nvsheng*</u> *keyi tai-qi   yi jia gangqin*   (Mandarin)
           three Cl girl   can lift-up one Cl   piano
           'Three girls can lift a piano.'
        d. <u>*si-hni sɔ   ma*</u> *gaqip gur qy dox*.   (Yi)
           girl three Cl   piano Cl   lift can
           'Three girls can lift a piano.'

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