Distributivity and Reflexivity

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In this paper I consider some peculiar properties of reflexive sentences in Mandarin, indicating that the bare reflexive *ziji* exceptionally induces distributivity on a plural antecedent—in both local binding and long-distance binding.[*] Despite the appeal of a uniform explanation for the distributivity effects, it will be argued that the distributivity of a local plural binder should be derived from a different source than the distributivity of a long-distance antecedent. This is in line with a non-uniform approach which treats the locally bound *ziji* as an instance of a syntactic anaphor, and the long-distance *ziji* as a logophor. The correctness of our account of distributivity then lends further support to the non-uniform approach.

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1. Two Distributivity Puzzles

1.1 Plurals and Distributivity

It is generally agreed that English plural noun phrases admit of both a collective and a distributive reading, as illustrated in (1):

(1) a. They bought a car.
   b. John and Bill read two books.

According to (1a) they may have bought a car together, or they may have each bought a car; and in (1b) John and Bill may have read a total of two books (the collective reading), or they may have each read two, for a total of four, books (the distributive reading).

 In Chinese, however, plural NPs generally do not exhibit the distributive reading without a special marker for distributivity. Thus, the Chinese counterparts of (1) are unambiguous, admitting of only a collective reading each:

(2) a. Tamen mai-le yi-liang che.
    They buy-PERF one-CL car
    'They bought a car.'   (Collective reading only.)

   b. Zhangsan he Lisi kan-le   liang-ben shu.
    Zhangsan and Lisi read-PERF two-CL   book
    'Zhangsan and Lisi read two books.'
           (Collective reading only.)

A distributive reading requires the presence of *dou* 'all' or *ge* 'each'. [1]

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[1] Both *dou* 'all' and *ge* 'each' have the force of universal quantification and of distributivity. The English glosses for these words do not capture their differences adequately. One way to talk about the differences between *dou* and *ge* is that whereas the former is a 'mass' distributor, the latter is a 'count' distributor (or, in the words of Lin (1998), that *ge* distributes over extensional classes while *dou* operates on intensional expressions). In terms of the 'relational' theory of distributivity developed in Choe (1987), *ge* 'each' requires a c-commanding plural term representing the 'sorting key' and an indefinite quantity expression in its c-domain representing the 'distributive share'. In (i) the sorting key is *tamen* 'they' and the distributive share is '3 books'. For *ge*, the sorting key must be a plural term and the distributive share an indefinite one. Both must be count NPs:

 (i) tamen ge mai-le san-ben shu.
     They each buy-PERF three-CL book
     'They each bought three books.'

(3)   a.   Tamen dou/ge mai-le   yi-liang che.
            They   all/each buy-PERF one-CL   car
            'They all/each bought a car.'

                                                   (Distributive reading only.)

       b.   Zhangsan he   Lisi dou/ge   kan-le   liang-ben shu.
            Zhangsan and Lisi all/each   read-PERF   two-CL   book
            'Zhangsan and Lisi both/each read two books.'

                                                   (Distributive reading only.)

(ii)   *tamen   ge   mai-le   shu.
         they   each   buy-PERF   book
         For: 'They each bought books.'
(iii)   *tamen   ge   mai-le   na-ben   shu.
         they   each   buy-PERF   that-CL   book
         For: 'They each bought that book.'
(iv)   *ta   zheng   ben   shu   ge   kan   le.
         he whole   volume   book each   read   PERF
         For: 'He read the entire book.'
(v)   *ta   shui   ge   he   le.
         he water   each   drink PERF
          For: 'He drank all the water.'

The occurrence of *dou* is much freer.   All of (i-iv) are well-formed if *ge* is replaced by *dou*:

(vi)   tamen   dou   mai-le   san-ben   shu.
         they   all   buy-PERF   three-CL   book
          'They all bought three books.'
(vii)   tamen   dou   mai-le   shu.
         they   all   buy-PERF   book
         'They all bought books.'
(viii)   tamen   dou   mai-le   na-ben   shu.
         they   all   buy-PERF   that-CL   book
         'They all bought   that book.'
(ix)   ta   zheng   ben   shu   dou kan   le.
         he whole   volume   book all   read   PERF
         'He read the entire book.'
(x)   ta   shui   dou   he   le.
         he   water   all   drink PERF
          'He drank all the water.'

While *ge* distributes over atomic entities each of which corresponds to a count noun, *dou* is able to distribute over molecules that make up sub-lattices of singular atoms, plurals, or masses. In (vii)-(viii) the distributive share is provided by indefinite slices of the kind 'books' or copies (tokens) of the singular object 'that book'.   In (ix) and (x), *dou* distributes over sub-lattices of NP denotations as its sorting key and (possibly) sub-events (or properties) as its distributive share.   For discussion of the properties of *ge*, see T.-H. Lin (1998).   For the semantics of *dou*, see S. Huang (1996), Li (1997), J. Lin (1998) and references cited there.

This is clearly a systematic contrast of considerable comparative significance, and is the subject of investigation for J. Lin (1996, 1998), S. Huang (1996) and X. Li (1997). Li highlights the Chinese-English contrast by comparing an English sentence of the sort studied in Heim, Lasnik and May (1991, HLM) with its Chinese counterpart. HLM observed that 5 different readings may be obtained from the English sentence (4), depending on whether the matrix subject or the embedded subject, or both, are interpreted collectively or distributively.

(4)   John and Mary argue that they will win $100.
    a.   [John and Mary]1 argue that they1 will win $100.
    b.   [John and Mary]1 argue that [they1 D2] will win $100.
    c.   [[John and Mary]1 D2] argue that they1 will win $100.
    d.   [[John and Mary]1 D2] argue that [they1 D3] will win $100.
    e.   [[John and Mary]1 D2] argue that they2 will win $100.

According to (4a), John and Mary together claim that they, together, will win $100.[2] According to (4b), they claim "We will each win $100." In (4c-e), John and Mary both make the following claims, respectively: "We (together) will win $100," "We will each win $100," and "I will win $100."

In sharp contrast, the Chinese sentence in (5) has only one reading, that corresponding to (4a).

(5)   Lao Zhang he Lao Li shuo tamen hui   zhong yibai yuan.
    Lao Zhang and Lao Li say   they   will hit   100   dollar
    Lao Zhang and Lao Li argued that they would win $100.

The distributive readings indicated in (4b-e) are obtained only if *dou* (or *ge*) is inserted in the position corresponding to D in (4):

(6)   Lao Zhang he Lao Li shuo tamen dou hui zhong yibai yuan.
    Lao Zhang and Lao Li say   they   all   will hit   100   dollar

Lao Zhang and Lao Li argued that both of them would win $100.

(7) Lao Zhang he Lao Li dou shuo tamen hui zhong yibai yuan.
Lao Zhang and Lao Li all   say   they will hit   100   dollar
Both Lao Zhang and Lao Li argued that they would win $100.

(8) Lao Zhang he Lao Li dou shuo tamen dou   hui zhong yibai yuan.
Lao Zhang and Lao Li all   say   they all   will hit   100 dollar
 Both Lao Zhang and Lao Li argued they would both win $100.

(9) Lao Zhang he   Lao Li   dou shuo ziji hui   zhong yibai yuan.[3]
Lao Zhang and Lao Li   all   say   self will hit   100   dollar
Both Lao Zhang and Lao Li argued, "I will win $100."

This behavior of Chinese plurals seems to hold quite generally, except where the predicates inherently resist a collective reading.   For example, to cry or have swollen eyes is an event that can only happen to singular individuals.   The ability or tendency to cry is not a property of a group. So if it is true that a group of people are crying or have swollen eyes, then it is also that each of them is crying or has swollen eyes.   In the following sentences, the distributive reading is available even though *dou* is not present:

(10) Tamen ku-de yanjing zhong-le   qilai.
they   cry-DE eye   swell-PERF up
'They cried so much that their eyes got swollen.'

The addition of *dou* following the plural in (10) adds no content to the sentence with respect to its distributivity; it simply adds the force of universal quantification, emphasizing that the event occurred without exception to all members of the group that the subject denotes.   In other

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[3] (9) and (4e) represent the bound reading of the embedded subject.   Under this reading the embedded subject must be rendered by a reflexive.   Although for many speakers the singular pronoun *ta* may be used as a bound variable with a singular antecedent like 'everybody', with a plural antecedent neither a singular nor a plural pronoun is acceptable:
  (i)   mei-ge   ren$_i$ dou shuo ta$_i$ meiyou   kong.
          Every-CL person all   say   s/he not-have   leisure
          'Everybody says that s/he has no time.'
  (ii)   *[Zhangsan gen Lisi]$_i$ dou   shuo ta$_i$/tamen$_i$ meiyou   kong.
           Zhangsan and Lisi all   say   he/they   not-have   leisure
          'Both Zhangsan and Lisi say that he/they have no time.'

words, a sentence may be inherently distributive, and as such the distributivity need not be signaled by *dou*.

1.2 Puzzle One: Local Reflexive

Now, let's consider reflexive sentences with plural subject antecedents:

(11) a. They praised themselves.

      b. John and Mary criticized themselves.

Like (1) and (4) above, both English sentences in (11) may be said to be ambiguous between a distributive and a collective reading, although the nature of distributivity is somewhat different between these and the earlier examples.   In the earlier examples, an indefinite expression denoting the 'distributive share' (*a car*, *one hundred dollars*, etc., see note 1) appears in the predicate, so that a distributive reading on a plural subject would entail a multiplied quantity of the distributive share (a total of 2 cars bought, 4 books read, etc.).   We can easily distinguish between the collective and distributive readings by pointing to the multiplication, or lack thereof, of the distributive share.   In (11), however, the plural subject is not related to an indefinite expression in the predicate, but to an anaphor coindexed with it. Under no circumstances will these sentences convey the meaning that the denotation of the plural subjects engaged in the praising or criticism of a multiple of themselves.   However, a significant distinction can still be made between the distributive and collective readings, as follows.

One specific scenario which makes the sentences in (11) true is when each member of the set {they} or of {John, Mary} was engaged in an action of self-praise or self-criticism (e.g., each of them says, "I am great" or both John and Mary say, "I am wrong.").   This is the distributive reading.   The 'sorting key' (see note 1) is the plural subject in each case, and the distributive share may be said to be one "self," even though the object is actually expressed by a plural term, *themselves*.   In this way we could say that the distributive reading does involve a multiple of selves.[4]   Note that under the distributive reading, each atomic event involving a singular member of the plural subject is an event of self-praise or self-criticism.

The sentences in (11) can have the collective reading and be true under many other scenarios.   For (11a), it may be that each member of the group {they} praises the entire group (including himself or herself).   Or it may be

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[4] In other words, the plural *themselves* is an example of what is known as the 'dependent plural' in the literature.   See Roberts (1987) for a review.

that each member praises *at least* one member of his/her own group *and* is also praised by at least one member of the group.[5] (In the former situation each might say, "We are marvelous," and in the latter each might say "She is great" or "You are great", etc.) Or it may be any scenarios intermediate between these two extremes. Note that for the collective reading, each atomic event (if we are to look into smaller sub-events of each scenario) need not be an event of self-praise or self-criticism. In fact, the collective reading may be true of a scenario where members of a group actually praise or criticize *each other* (hence, the group reading includes the reciprocal reading). Such an event of mutual praise or criticism by a group's members, when viewed externally, is an event of self-praise or self-criticism by the group as a whole.

Let's turn now to Chinese reflexive sentences with *ziji*. Given the contrasts with English we saw, we expect that they should only admit of the collective reading. The fact, however, is just the opposite. The following sentences only have a distributive reading:

(12) a. Zhangsan he Lisi zai piping ziji.
Zhangsan and Lisi at criticize self
'Zhangsan and Lisi are criticizing themselves.'

b. Tamen you zai kuajiang ziji le.
They again at praise self ASP
'They are praising themselves again.'

According to (12a), both Zhangsan and Lisi are engaged in some act of self-criticism, and according to (12b), each of *tamen* 'them' is praising himself/herself. The sentences would not be appropriate for scenarios where members of a group are each praising or criticizing the whole group or each other. The following contrast between English and Chinese illustrates the same point. Although pragmatic considerations strongly favor a collective reading (as in the English example (13a)), (13b) is understood in distributive sense:

(13) a. John and Bill lifted a piano.

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[5] These represent the "strong symmetric" and "weak symmetric" versions of the collective reading in Gil's (1982) terminology.

b. Zhangsan he   Lisi   tai-qi-le   ziji-de gangqin.
   Zhangsan and Lisi   lift-up-PERF self's   piano
   'Zhangsan and Lisi [respectively] lifted their pianos.'

The point can also be seen by comparing (12) with (14), where instead of the bare reflexive *ziji* we have the compound form *pronoun + ziji*.

(14) a. Zhangsan he   Lisi zai piping   tamen-ziji.
         Zhangsan and Lisi at   criticize themselves
         'Zhangsan and Lisi are criticizing themselves.'

      b. Tamen you   zai kuajiang tamen-ziji le.
         They   again at   praise   themselves ASP
         'They are again praising themselves again.'

These sentences are more on a par with their English counterparts in (11) in readily allowing a group reading. To obtain a clear distributive reading, *dou* can be added:

(15) a. Zhangsan he   Lisi dou zai   piping   tamen-ziji.
         Zhangsan and Lisi all   at   criticize   themselves
         'Both Zhangsan and Lisi are criticizing themselves.'

      b. Tamen you   dou zai kuajiang   tamen-ziji   le.
         They   again all at   praise   themselves ASP
         'All of them are praising themselves again.'

However, even in (15) the distributive reading should still be distinguished from that observed with (12). In (15) only the plural subjects are interpreted distributively, but not the objects. So these sentences can still be true where each individual denoted by the subject criticizes or praises the entire group (e.g., saying "We are wrong," etc.). In (12), however, distributivity extends to both the subject and the reflexive object, so that only a one-one relationship of self-praise or self-criticism is intended in each case. These sentences in (12) are strongly distributive, in that both the 'sorting key' and the 'distributive share' are singularized.
    We have thus observed a peculiar property of the bare reflexive *ziji*, which raises the following question: What is it about the bare reflexive *ziji* that makes a sentence (strongly) distributive?

1.3 Puzzle Two: Long-Distance Reflexive

Now let us turn to sentences in which the bare reflexive is long-distance bound. It has been well known that the bare *ziji* can have an antecedent outside of its governing category:

(16)   Zhangsan$_i$ shuo Lisi$_j$ piping-le   ziji$_{i/j}$
          Zhangsan say Lisi criticize-PERF self
          Zhangsan said that Lisi criticized him/himself.

Y.-H. Huang (1984) made an early observation that long-distance binding is not free, but subject to blocking under certain circumstances. For example, a local first- or second-person NP prevents a remote third-person NP from being a long-distance antecedent, so in contrast to (16), neither (17) nor (18) permits long-distance binding:

(17)   Zhangsan$_i$ shuo wo$_j$ piping-le   ziji$_{*i/j}$
          Zhangsan say   you criticize-PERF self
          Zhangsan said that I criticized *him/myself.

(18)   Zhangsan$_i$ shuo ni$_j$ piping-le   ziji$_{*i/j}$
          Zhangsan say   you criticize-PERF self
          Zhangsan said that I criticized *him/myself.

Tang (1989) noted that although a plural local subject does not block a singular remote antecedent:

(19)   Zhangsan$_i$ shuo tamen$_j$ piping-le   ziji$_{i/j}$.
          Zhangsan say they   criticize-PERF self
          Zhangsan said that they criticized him/themselves.

a singular local subject does seem to block a plural remote antecedent:

(20)   Tamen$_i$ shuo Zhangsan$_j$ piping-le   ziji$_{*i/j}$
          They   say Zhangsan criticize-PERF self
          They said that Zhangsan criticized *them/himself.

If the plural remote antecedent is followed by *dou* 'all' and hence interpreted distributively (and singularly), long-distance binding again becomes possible.

(21) Tamen$_i$ dou shuo Zhangsan$_j$ piping-le   ziji$_{i/j}$
      They   all   say   Zhangsan criticize-PERF self
      'Every one of them said that Zhangsan criticized him/himself.

   It turns out, however, that (19)-(21) do not represent the whole picture. Rather than a generalization about blocking, the real generalization seems to be that a plural NP simply cannot serve as the long-distance antecedent of *ziji*, unless it is overtly marked to be distributive.[6] Thus, consider (22), where the embedded and matrix subjects are both third-person plural. Although no blocking effects are expected, *ziji* still cannot be bound by the higher *tamen* 'they':

(22) Tamen$_i$ shuo tamen$_j$ chang piping ziji$_{*i/j}$.   (i ≠ j)
      they   say   they   often criticize self
      'They$_i$ said that they$_j$ often criticize self$_{*i/j}$.'

But if the matrix subject is marked for distributivity by *dou*, then long-distance binding becomes possible again:

(23) Tamen$_i$ dou shuo tamen$_j$ chang piping ziji$_{i/j}$.   (i ≠ j)
      they   all say   they   often criticize self
      'Each of them$_i$ said that they$_j$ often criticize him$_i$/themselves$_j$.'

   The real generalization is similar to the one we arrived at in the preceding sub-section. Like locally bound *ziji*, long-distance *ziji* allows a plural remote antecedent, but requires such an antecedent to be interpreted distributively. The important difference is that, unlike the local plural binder, distributivity for the long-distance binder must be marked by an overt distributor like *dou*, and this difference constitutes a second puzzle. In this respect the long-distance plural NP is not exceptional; it is normally interpreted collectively unless explicitly marked for distributivity. The puzzle is why a reflexive *ziji* induces distributivity on its local and remote antecedents in such different ways.

2. *Ziji* is Singular?

Why does the bare reflexive *ziji* induce distributivity?   One suggestion that quickly comes to mind is the hypothesis that the bare reflexive *ziji*, which lacks any overt specification of its phi-features, is inherently (lexically)

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[6] See also Xu (1993) for a similar point.

specified as [-plural]. Under this hypothesis, distributivity is forced upon the Chinese sentences in (12) because a singular anaphor cannot take a plural antecedent.

While I think the idea that *ziji* has to do with atomicity is on the right track, the simple hypothesis that it is lexically singular will not work to explain the puzzles. This hypothesis basically amounts to saying that *ziji* is covertly equivalent with the Chinese counterparts of *himself, herself, myself,* or *yourself,* but not to *themselves, ourselves,* or *yourselves*. The obligatoriness of the distributive reading in (12a) is then likened to the ungrammaticality of *They criticized himself.* The problem here is that (12a) is itself fully grammatical, but becomes fully ungrammatical once the bare reflexive is replaced with an overt singular *taziji*:

(24)   *Zhangsan he Lisi zai piping   taziji.
         Zhangsan and Lisi at   criticize himself
         '*Zhangsan and Lisi are criticizing himself.'

This is the case even if distributivity is explicitly signaled by the presence of *dou* 'all':

(25)   *Zhangsan he   Lisi dou zai piping   taziji.
         Zhangsan and Lisi all   at   criticize himself
         '*Zhangsan and Lisi are both criticizing himself.'

In fact, even under the distributive reading, a compound reflexive taking a plural antecedent must take the plural form *tamen-ziji* 'themselves':

(26)   Zhangsan he   Lisi (dou) zai piping   tamen-ziji.
         Zhangsan and Lisi (all)   at   criticize themselves
         'Zhangsan and Lisi are (both) criticizing themselves'

In other words, the fact remains that (12a) is grammatical but has only a distributive reading. The distributive reading cannot be reduced to the supposed singularity of the bare reflexive. In fact, given the facts in (24)-(26), the grammaticality of (12a) suggests that if the bare reflexive were to be assigned number features, it must be possible for it to have the [+plural] feature, regardless of whether the antecedent is to be interpreted collectively or distributively. The same point can be made with (compound) reflexives or bound variable pronouns with plural antecedents interpreted distribu-tively:

(27)   They each criticized themselves.

(28)   The contestants each think that they are the best.

Here *themselves* and *they* are examples of what have been known as
'dependent plurals' in the literature, on a par with the following (see, e.g.,
Roberts 1987 and references cited).

(29)   a.   They have bleeding noses.

        b.   *They have a bleeding nose.

All of these sentences on their distributive reading would involve objects
that are semantically singular, even though the objects themselves are
expressed in the plural form.
       Thus, although the singularity/plurality of an argument may affect the
singularity/plurality of another (especially if they are coindexed), it does not
seem to affect the distributivity of the latter.   Given that a bare reflexive
can occur with a plural subject grammatically, it must be possible to assign
the feature [+plural] to *ziji* in such environments. The question then remains
why, unlike the compound reflexives and other plural bound pronouns, the
bare reflexive requires a distributive reading of its plural subject.

3. *ziji* and LF-Raising

Although the singularity/plurality of an object does not affect the
distributivity of its subject, the singularity of a *predicate* may entail the
distributivity of its subject.   If a predicate denotes an atomic event or
property, which by its nature can only be attributed to one individual at a
time, then any plural subject occurring with such a predicate will
necessarily be distributive.   This is true of cases like (10) above.   Below
are a few more examples:

(30)   a.   John and Bill coughed.

        b.   They are shaving themselves.

        c.   They have bloody noses.

These sentences must have a distributive reading, since the property of
coughing, shaving oneself or having a bloody nose is the property of a
single human being, and this is the case even if John and Bill synchronize

their action and cough, shave, or have bloody noses exactly at the same time in the same place. In this connection, note that a lexical reflexive predicate has exactly this property of denoting an atomic event or property, forcing distributivity on a plural subject. This is true of both English and Chinese *self*-prefixed predicates:[7]

(31) a. By self-inflicting these wounds, they tried to win our sympathy.

   b. Their self-appraisals were rather self-serving.

   c. They are overly self-criticizing.

(32) a. Zhangsan he   Lisi   zai   ziwo-piping.
         Zhangsan and Lisi   at   self-criticize
         'Zhangsan and Lisi are engaged in self-criticism.'

   b. Tamen   zi-sha   le.
         They   self-kill ASP
         'They committed suicide.'

These sentences contrast with those in which a compound reflexive, like *themselves* or *tamen-ziji*, occurs as a separate co-argument (see (11) and (15)). Thus according to (31a) each of them must have inflicted wounds upon himself/herself, whereas a sentence like *They inflicted wounds upon themselves* may be true of a scenario where members of a group actually inflicted wounds on each other. Similarly, (32a) is true only of a scenario where both Zhangsan and Lisi are engaged in an act of self-criticism, but not where they criticize each other.[8]

   Recall that our first puzzle is that the bare *ziji*, but not the compound *tamen-ziji*, induces distributivity.

(12a) Zhangsan he   Lisi zai piping   ziji.
         Zhangsan and Lisi at   criticize self
         'Zhangsan and Lisi are criticizing themselves.'

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[7] In English, *self*-prefixed predicates are usually adjectival or nominal, but rarely verbal (as in (31c), due to Matthew Whelpton, personal communication). In Chinese, *zi-* and *ziwo-* can easily occur as verbal prefixes.

[8] Remember that there is also the "group-as-individual" reading for both (32a) and sentences like (11) and (15). In this case, the plural subject is treated as a singular entity, and the issue of distributivity does not arise.

(14a) Zhangsan he   Lisi zai piping   tamen-ziji.
       Zhangsan and Lisi   at   criticize themselves
       'Zhangsan and Lisi are criticizing themselves.'

In this respect, the bare *ziji* behaves like a lexical reflexive predicate, in contrast to the compound reflexive.

Why should a predicate containing a *bare* reflexive argument behave like a lexical reflexive predicate? I suggest that this is because such a predicate is indeed a lexical reflexive predicate at the level of LF, much as first proposed by Lebeaux (1983) and Chomsky (1986). In particular, at LF, the bare reflexive *ziji*, but not the compound *taziji* or *tamen-ziji*, raises and left-adjoins to the governing or immediately c-commanding verb, so that at the level of LF, (12a) has the representation in (33):

(33)   Zhangsan he   Lisi zai ziji$_i$-piping   t$_i$.
       Zhangsan and Lisi at   self-criticize
       'Zhangsan and Lisi are engaged in self-criticism.'

In other words, the bare reflexive which appears as a postverbal argument in overt syntax, is in fact an LF-prefix, just like the prefix *ziwo* in (32a), as part of a lexical reflexive predicate. Given that a reflexive predicate denotes an atomic event attributable only to singular but not plural individuals, we may say that the bare reflexive, by forming a reflexive predicate in LF, "singularizes" a predicate, forcing it to denote atomic events.

The LF raising analysis thus provides the following answer to the first puzzle. Plural subjects in Chinese are normally interpreted collectively, except when they take predicates that are inherently distributive, such as those exemplified in (30)-(32), including but not limited to lexical reflexive predicates. Bare reflexives form lexical reflexive predicates in LF, so they force a distributive interpretation on their plural subjects as well. In other words, in the case of locally bound bare reflexives, distributivity of the subject is derivative of singularity of the predicate.

The LF raising analysis originates, of course, with Lebeaux (1983) and Chomsky (1986), and has been extended by Pica (1987), Battistella (1987) and Cole et al.(1990) and others in accounts of long-distance anaphora. However, our account must differ from these previous proposals in two crucial respects.

First, unlike Lebeaux and Chomsky, but in line with Pica, Battistella, and Cole et al, I assume that only the *bare* reflexive, but not the compound reflexive, undergoes LF head-movement to V. This must be the case, for our present purposes, because only the bare reflexive, but not the compound

reflexive, induces distributivity. This is also supported by general considerations of movement theory. Since the movement is an instance of head-movement, it involves only the bare reflexive, an X^0 element, but not the compound reflexive, an XP.

Second, unlike Pica, Battistella and Cole et al, I assume that the bare reflexive only moves locally, to an immediately c-commanding verb, but does not move further beyond to a higher domain. This must be the case, for our present purposes, given the fact we saw above that a long-distance plural antecedent of the bare reflexive must be marked for distributivity by an appropriate element like *dou*. Some relevant examples are repeated below (cf. (20) and (21)):

(34)   *Tamen$_i$ shuo Zhangsan piping-le   ziji$_i$.
        They   say   Zhangsan criticize-PERF self
        They said that Zhangsan criticized them.

(35)   Tamen$_i$ dou shuo Zhangsan piping-le   ziji$_i$.
        They   all say   Zhangsan criticize-PERF self
        'Everyone of them said that Zhangsan criticized him/her.

If *ziji* were to move (successive cyclically) to the higher verb in (34), the following LF representation would result:

(36)   Tamen$_i$ ziji$_i$-shuo Zhangsan   piping-le   t$_i$.
        They   self-say   Zhangsan   criticize-PERF

Since the matrix verb is now a lexical reflexive predicate, we expect it to force a distributive reading on the subject without the aid of *dou*, but as indicated by the contrast between (34) and (36), this expectation is not fulfilled.

The assumption that *ziji* only raises to the local verb is also justified on general considerations as well. It is well known that head-movement is generally bounded within the domain of a finite clause, and obeys strict minimality and island conditions (more than XP-movement does). It is therefore desirable to limit the head-movement of *ziji* to the local clause.[9]

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[9] As is required by some appropriate minimality conditions, e.g., the Head-Movement Constraint of Travis (1984). Sze-Wing Tang (personal communication) observes an interesting contrast between bare noun phrases and numeral classifier phrases with respect to the interpretation of *ziji*.

(i)   Tamen yanzou-le ziji de gequ.

To summarize, we have seen that the problems posed in Section 1 receive an explanation under the assumption that the bare reflexive raises to a local c-commanding verb in LF.   It forms an LF reflexive predicate with the local verb, thus deriving distributivity of a local plural subject unmarked by *dou*.   Because head-movement is clause-bounded, *ziji* does not form a reflexive predicate with a higher verb, and therefore it does not remove the need of *dou* to mark the distributivity of the remote plural antecedent. This, then, leaves the question still unanswered as to why a plural long-distance antecedent of *ziji* must have distributive interpretation.   Let us turn to this question now.

4. Long-Distance *ziji*, Variable Binding and Attitudes

I claim that the answer to this question comes from the semantics of logophoricity and the assumption that the long-distance *ziji* is a logophor. More specifically, a logophoric *ziji* has the status of an A-bar variable at LF and semantic representation, bound by an operator that ranges over individuals capable of '*de se* beliefs' in the sense of Lewis (1979).   To

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          they   play-PERF self DE   song
          'They played their songs.'

  (ii)   Tamen yanzou-le   yi-shou guanyu ziji   mingyun de   gequ.
         They   play-PERF one-CL about   self destiny   DE song
         They played a song about their destiny.

In particular, while the salient reading of (i) is that they played different songs (the distributive reading), it is possible to get a group reading in (ii), according to which they played the song which is about the destiny of *tamen* 'they' as a group.   An acceptability contrast obtains when a collective predicate is used:

  (iii)   ??Tamen he-xie-le   ziji de shu.
          they join-write-PERF   self DE book
            'They wrote a book about themselves in collaboration.'

  (iv)   Tamen he-xie-le   yiben   youguan ziji   de   shu.
          they   join-write-PERF one-CL about   self DE book
            'They wrote a book about themselves in collaboration.'

The ill-formedness of (iii) suggests that distributivity is being unnaturally forced upon a collective (plural) predicate.   The acceptability of (iv) shows that the collective reading is allowed, according to which the book they collaborated on was one about themselves.

     Why should a collective reading be allowed when *ziji* is embedded within a numeral classifier phrase?   Tang suggests that this is due to minimality and the possibility that a numeral or classifier may head a functional projection of its own.   Given this possible structure, the functional categories (Num and Cl) within the nominal phrases in (ii) and (iv) will block the LF movement of *ziji*.   No reflexive predicate is formed in this case, and the subject is not required to be distributive.

make this point clear, I must briefly describe the theory of long-distance *ziji* assumed here.

Despite various previous attempts at providing a uniform syntactic or pragmatic account of the bare reflexive *ziji*, many scholars have now converged on the viewpoint that local and long-distance reflexives deserve different treatments. In particular, it is believed that many instances of long-distance binding should not be brought under the standard theory of anaphor binding (cf. Chomsky's Binding Condition A), but should be treated as instances of logophoric binding. The core cases of logophoricity are those where the antecedent of a (long-distance) reflexive refers to an individual who has first-hand knowledge of particular events being described and is disposed to describe such events using the first-person pronoun. Huang et al. (1984), following Kuno (1972), made an early attempt to characterize the long-distance *ziji* as originating from the pronoun *wo* 'I/me' in a direct-discourse underlying representation. Thus, (37) has the representation (38):

(37)   Zhangsan shuo Lisi chang piping ziji.
        'Zhangsan said that Lisi often criticized self.'

(38)   Zhangsan shuo, "Lisi chang piping wo."
        Zhangsan said, "Lisi often criticized me."

Chierchia (1989), drawing on Lewis (1979), developed a formal account of interpretive semantics that treats the intended reading of (37) as representing a *de se* belief of Zhangsan.[10] Central to Chierchia's proposal is that under this sort of reading the complement clause has the structure of secondary predication and operator binding. Following this approach, Huang and Liu (1999) propose that (37) has the following structure at LF,

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[10] Lewis' *de re* vs. *de se* distinction may be illustrated with a sentence like (i), where *his* and *Pavarotti* are coindexed:

(i)   Pavarotti$_i$ said that his$_i$ pants were on fire.

The *de re* reading simply describes the speaker's knowledge of the co-reference relation, but makes no claim as to whether Pavarotti himself was aware of this co-reference relation, i.e., that it was his own pants that were on fire. The *de se* reading, on the other hand, refers to the specific scenario where Pavarotti was actually aware of his own pants being on fire. Under the *de re* scenario, Pavarotti might have said, "His pants are on fire," and under the *de se* scenario, he would be disposed to say, "My pants are on fire!". Chierchia argues that these two readings should be semantically represented as in (ii)-(iii):

(ii) λx (said (x, x's pants were on fire)) (P)   (*de re*)
(iii)   said (P, λx (x's pants were on fire))   (*de se*)

with *ziji* IP-adjoined to the complement clause, binding its trace as a bound variable.[11]

(39) Zhangsan shuo [$ziji_i$ [Lisi chang piping t_i]].
      Zhangsan say   self   Lisi often criticize

The operator *ziji* corresponds to a lambda operator in semantic represent-ation:

(40) Zhangsan shuo (λ_x (Lisi chang piping x))

(41) said (Z, λ_x (often-criticize (L, x)))

These are structures of secondary predication subject to what Chomsky (1986) called 'strong binding', by which the operator is coindexed with the subject *Zhangsan* and has its *range* determined by it.

     Returning now to the question of plural antecedents for the long-distance *ziji*, as illustrated in (42), recall that the problem is that the plural antecedent must be understood in the distributive sense and be overtly marked by *dou*.

(42) $Tamen_i$ dou shuo Zhangsan piping-le $ziji_i$
      They   all say Zhangsan criticize-PERF self
      'Everyone of them said that Zhangsan criticized him/himself.

Under the intended reading, (42) has the LF structure (43):

(43) $Tamen_i$ dou shuo [$ziji_i$ [Zhangsan piping-le t_i]]
      They   all say   self   Zhangsan criticize-PERF
      'Everyone of them said that Zhangsan criticized him/her.'

The '*de se* operator' (as we shall call the IP-adjoined *ziji*) is subject to strong binding by the plural subject in order to obtain its range.   What we need to do is ensure that this operator ranges over individual members of 'they', but not over groups.   It seems that this can be stipulated as a matter

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[11] For more details see Huang and Liu (1999) and the references cited.   I shall only present a minimum part of the relevant analysis here.   Note that the IP-adjunction of *ziji* is a case of XP-movement.   The bare reflexive is an N^0 under NP.   Hence *ziji* may be head-moved as an N^0 or it may be IP-adjoined as XP.

of definition since, normally, only individuals but not groups are capable of having inner feelings like *de se* beliefs:[12]

(44)　A *de se* operator ranges over individuals, not over groups.

Strictly speaking, an individual with *de se* attitudes is one who thinks, "I am such and such," but not one who thinks, "We are such and such," or one of a group who think of each other as being such and such. Recall that a group reading would include scenarios where members have certain beliefs about each other, but such beliefs fall outside of the definition of *de se* beliefs. In other words, a true *de se* belief entails the interpretation of the long-distance (logophoric) *ziji* as a variable strongly bound by an antecedent that is (semantically) singular.[13] To qualify as such a binder, the plural subject in (43) must be distributed. Note that the matrix verb is not reflexivized and does not obligatorily denote atomic events. And since Chinese plurals do not distribute without an overt marker, the obligatory occurrence of *dou* is explained.

That the *de se* requirement on a long-distance *ziji* drastically reduces the range of possible interpretations of a sentence can also be appreciated by looking at the earlier example (4) again:

(4)　John and Mary argue that they will win $100.
　　a.　[John and Mary]1 argue that they1 will win $100.
　　b.　[John and Mary]1 argue that [they1 D2] will win $100.
　　c.　[[John and Mary]1 D2] argue that they1 will win $100.
　　d.　[[John and Mary]1 D2] argue that [they1 D3] will win $100.
　　e.　[[John and Mary]1 D2] argue that they2 will win $100.

Recall that (4a-e) represent the following 5 readings for (4): (4a) represents the group reading for both the matrix and the embedded subject, while (4d)

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[12] One might suggest that there is no need for (44), and that the distributivity of the long-distance antecedent of *ziji* simply follows from *ziji* being a bound variable. This alternative suggestion is not sufficient to ensure our desired result, though, because the semantic atomicity of a variable depends on what its operator ranges over. An operator may range over groups, and so a variable need not always denote a singular atom.

[13] What about the group-as-individual reading, including cases where a group of people constitute an organization or institution? While such cases do qualify for the requirement of being a "singular individual", the collective body made up of the members is not itself a natural holder of *de se* beliefs, since groups by themselves cannot believe. A group can have a certain mental attitude by virtue of everyone of its members having that mental attitude. But in that situation we can say that the *de se* reading comes from each member having a *de se* belief, not the group by itself.

represents the distributive reading for both subjects. In (4b), the matrix subject is collective and the embedded subject distributive, while in (4c) this situation is reversed. Finally, in (4e) the matrix subject is distributed and the embedded subject is a variable bound by the distributed matrix subject. Recall also that these 5 readings are rendered in the following distinct forms, respectively:

(5)   Lao Zhang he   Lao Li shuo tamen hui   zhong yibai yuan.
        Lao Zhang and Lao Li say   they   will hit   100   dollar
        Lao Zhang and Lao Li argued that they would win $100.

(6)   Lao Zhang he   Lao Li shuo tamen dou hui zhong yibai yuan.
        Lao Zhang and Lao Li say   they   all will hit   100   dollar
        Lao Zhang and Lao Li argued that both of them would win $100.

(7)   Lao Zhang he   Lao Li dou shuo tamen hui zhong yibai yuan.
        Lao Zhang and Lao Li all   say   they   will hit   100   dollar
        Both Lao Zhang and Lao Li argued that they would win $100.

(8)   Lao Zhang he   Lao Li dou shuo tamen dou   hui zhong yibai yuan.
        Lao Zhang and Lao Li all   say   they   all will hit   100   dollar
        Both Lao Zhang and Lao Li argued they would both win $100.

(9)   Lao Zhang he   Lao Li   dou shuo ziji hui   zhong yibai yuan.
        Lao Zhang and Lao Li   all   say   self will hit   100   dollar
        Both Lao Zhang and Lao Li argued, "I will win $100."

What is particularly significant at this point is that, of all these sentences, only (9) permits (in fact requires) the use of *ziji* as its embedded subject. All of (5)-(8) require the plural pronoun *tamen* 'they' as their embedded subjects. In particular, (5) becomes ill-formed when *tamen* 'they' is replaced by *ziji,* which cannot take a plural, undistributed antecedent.

(5')   ??Lao Zhang he   Lao Li shuo ziji hui zhong yibai yuan.
            Lao Zhang and Lao Li say   self will hit   100   dollar

The ungrammaticality is even more severe when *ziji*, as a variable ranging over singular individuals, is itself forced to be distributed by *dou* (but cannot be), as in (6') and (8'):

(6')   *Lao Zhang he   Lao Li shuo ziji   dou hui zhong yibai yuan.
            Lao Zhang and Lao Li say self   all   will hit 100   dollar

(8')   *Lao Zhang he Lao Li dou shuo ziji dou hui   zhong yibai yuan.
         Lao Zhang and Lao Li all say   self all will   hit   100   dollar

And in (7), if the embedded subject is replaced by *ziji*, so the result will be indistinguishable from (9) in form, the interpretation is also necessarily identical to (9):

(7')   Lao Zhang he   Lao Li dou shuo ziji hui   zhong yibai yuan. (= 9)
         Lao Zhang and Lao Li all   say   self will hit   100   dollar
         Both Lao Zhang and Lao Li argued, "I will win $100."

That is, (7') cannot preserve the meaning of (7), with *ziji* interpreted collectively.   (7') cannot be true of the scenario where both Zhang and Li said "We will win $100.").

    The ungrammaticality of all of (5')-(8') follows if we say that the long-distance *ziji* is a variable bound by a '*de se* operator' ranging over singular individuals only, but not over groups.

    If this general idea of an operator that ranges over singular individuals is on the right track, we expect that logophors in other languages may exhibit similar strict distributivity effects as well.   This expectation is fulfilled by the Italian possessive logophor *proprio*.[14]   Thus (45) has only the strict distributive reading:

(45)   Pavarotti e Domingo hanno detto che i propri pantaloni sono in fiamme.
        'Pavarotti and Domingo have said that self's pants are on fire.'

That is, the sentence only means that both Pavarotti and Domingo said, "My pants are on fire."   The sentence does not have the meaning according to which Pavarotti and Domingo said, either separately or as a group, "Our pants are on fire."   Another example showing the same point:

(46)   Francesca e Maria hanno detto che i propri articoli sono pronti.
        Francesca and Maria have said that self's articles are ready.

Again, only the strict distributive reading is available: both Francesca and Maria said, *Il mio articolo e'pronto* 'My article is ready' or *I miei articoli sono pronti* 'My articles are ready'. That these sentences have only the

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distributive reading can again be reduced to the fact that *de se* beliefs hold of singular individuals, not of groups.[15]

5. Conclusion

In this paper, we observed that the bare reflexive *ziji* exceptionally induces distributivity on a plural subject antecedent, but in a way that distinguishes local and long-distance binding of the reflexive. It was shown that these exceptional properties follow from a grammar that treats local *ziji* as a case of syntactic anaphora and long-distance *ziji* as an instance of logophoricity. The local reflexive undergoes head-movement and forms a lexical reflexive predicate in LF. The reflexive predicate denotes atomic events and its subject, if plural, is interpreted distributively. The long-distance reflexive undergoes IP adjunction as an LF operator ranging over individual holders of *de se* beliefs, again forcing a distributive reading on a remote plural antecedent. The LF adjunction process does not, however, reflexivize or otherwise singularize the matrix predicate. Nothing in the predicate therefore automatically forces a distributive reading on any plural argument. To qualify as the antecedent of the *de se ziji*, a plural NP must rely on an overt marker like *dou*.

Our account of the two distributivity puzzles relies crucially on a distinction we make of the local and the long-distance reflexive: the former a syntactic anaphor which reflexivizes a local predicate and the latter a logophor representing *de se* attitudes of its antecedent. Needless to say, to the extent that this account of distributivity is correct, it lends important further support to the non-unitary approach to local and long-distance reflexives as developed, for example, in Huang and Liu (1999).

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[15] Unlike Chinese plurals, Italian plural NPs do in general allow for both collective and distributive readings. This is why (45)-(46) can have the distributive reading without being marked by *sia* 'both'. The strict distributive reading is of course available with *sia* as well:

    (i)   Sia Pavarotti che Domingo hanno detto che i propri pantaloni sono in fiamme.
         'Both Pavarotti and Domingo have said that self's pants are on fire.'
    (ii) Sia Francesca che Wu Di hanno detto che i propri articoli sono pronti.
         'Both Francesca and Wu Di said that self's articles are ready.'

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