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ON DOU-QUANTIFICATION*

This paper examines the frequently discussed quantifier *dou* 'all' in Mandarin Chinese.
I argue, following traditional grammarians as well as Lee (1986), that *dou* 'all' is an
adverb of quantification. I show that a floating quantifier analysis of *dou* 'all' along
the lines of Chiu (1990, 1993) falls short of accounting for the dual status of *dou*, as
a quantifier and a binder. As a quantifier, *dou* quantifies over regular NPs (plural).
As a binder, *dou* provides quantificational force for *wh*-polarity items, which do not
have inherent quantificational force. I argue that the locality restrictions associated
with *dou* varies depending on the element it is associated with. With regular NPs,
the locality is reflected by LF adjunction of *dou*. With *wh*-polarity items, the locality
is restricted by licensing of polarity items as well as its ability as a binder.

1. INTRODUCTION

The quantifier *dou* 'all' has generated much discussion not only in tradi-
tional Chinese grammars but also in recent linguistic literature. Recent works
on floating quantifiers (Sportiche 1988 among others) have raised new
controversies associated with *dou*. Chiu (1990, 1993) analyzes *dou* as a
floating quantifier on a par with *tous* 'all' in French in contrast with Lee
(1986), who follows more traditional analyses and treats *dou* as an adverb
of quantification. In this paper, I will argue for the position that *dou* is an
adverb of quantification. This analysis of *dou*, I will show, can address
the complexities associated with *dou* and in particular, the differences that
dou exhibits in the quantification of typical NPs in contrast with *wh*-phrases.

I will show that *dou* has an apparent dual function and that this leads
to different surface patterns with respect to adjacency and locality. As a
distributor, *dou* quantifies over plural entities. It does not have to be adjacent
to the NP it quantifies over even though there is a certain locality restric-
tion involved. On the other hand, *dou* can also serve as a binder of variables
providing them with universal quantificational force. As a binder, it does
not obey the locality restriction typically imposed on *dou*. An overview
of *dou* will be presented in section 2, where we can see various charac-
teristics of *dou*. Section 3 defends an account of *dou* as an adverb of
quantification, showing how the various locality effects can be handled. The
interaction between *dou* and *wh*-words is discussed in detail in section 4.
And finally in section 5, I will examine Chiu (1990, 1993) showing the
inadequacies in her analyses of *dou* as a floating quantifier.

2. PROPERTIES OF *DOU*

2.1. *The distribution of* dou

In this section, a basic overview of *dou* is presented. We will also see some locality effects induced by *dou*-quantification on non-interrogative NPs. There are some well-known characteristics of *dou*, exemplified (1)–(4).[1,2]

(1)   *Dou* occurs preverbally.

a. tamen *dou* lai-le
   they   all   come-ASP

   'They all came.'

b.*tamen lai-le   *dou*
   they   come-ASP   all

   'They all came.'

(2)   *Dou* quantifies NP to its left and the NP must have plural interpretations.[3]

a. tamen *dou* hen   xihuan wo
   they   all   very   like   I

   'They all like me.'

b.*ta *dou* hen   xihuan women
   he   all   very   like   us

   'He likes all of us.'

(3)   There is only one *dou* per clause.

   * women *dou* ba   zhexie xuesheng *dou* ma-ku-le.
     we   all   BA   these   student   all   scold-cry-ASP

   'We all scolded all of these students, and that made them cry.'

(4)   *Dou* does not have to be adjacent to its NP, but there are locality restrictions.

a. zhexie xuesheng wo *dou* xihuan
   these   student   I   all   like

   'I like all of these students.'

b.*zhexie xuesheng zhidao wo *dou* xihuan guojing
   these   student   know   I   all   like   Guojing

   'All of these students know that I like Guojing.'

Assuming these four basic characteristics, let us examine more closely the positions that *dou* can appear in. (5) shows that *dou* cannot appear before a subject even though there is an eligible topic for it to quantify over (and we have seen in (4) that *dou* can quantify over a topic). (6)–(8) show that negation differs from a *ba*-phrase and a *bei*-phrase in that it does not block *dou*-quantification. (A √ in the examples below indicates a location where *dou* is allowed.)[4]

(5)   *Neixie shu   *dou* zhangsan mai-le
         those   book   all   Zhangsan sell-ASP

         'Those books, Zhangsan sold them all.'

(6)   *Dou* and Negation

     a. neixie ren $\sqrt{}_i$ meiyou $\sqrt{}_j$ kan-guo neiben shu.
         those person not   read-ASP that   book

        (i) 'All of these people did not read that book.'
        (j) 'Not all of these people read that book.'

     b. neixie shu   lisi $\sqrt{}_i$ meiyou $\sqrt{}_j$ du-guo
         those book   Lisi   not   read-ASP

        (i) 'All of those books, Lisi did not carefully read.'
        (j) 'Those books, Lisi did not read them all.'

(7) a. neixie xuesheng $\sqrt{}$ ba   neiben shu $\underline{*}$ mai-le
         those student   BA   that   book   sell-ASP

        'All those students sold that book.'

     b. zhangsan ba   *neixie shu   dou* mai-le
         Zhangsan BA   those   book   all   sell-ASP

        'Zhangsan sold all those books.'

(8) a. neixie xiaohai $\sqrt{}$ bei lisi $\underline{*}$ qi-fu-guo
         those children   BEI Lisi   bully-ASP

        'Those children were bullied by Lisi.'

     b. zhangsan bei *zhexie laoshi   dou* ma-guo
         Zhangsan BEI these   teacher all   scold-ASP

        'Zhangsan has been scolded by all these teachers.'

As the (i) and (j) readings show in (6), the relative scope between *dou* and negation varies depending on the relative position of *dou* and the negative marker. If *dou* appears before negation, it has scope over negation whereas if it occurs after negation, negation has wider scope. (7)–(8) on

the other hand present a different picture. When a *ba*-phrase or a *bei*-phrase is involved, if *dou* is to quantify over the subject, it has to appear before these phrases. In other words, *ba*-phrases and *bei*-phrases act as blockers to *dou*-quantification (see also Lee (1986) among others).[5]

2.2. *Adjacency and Locality*

We have seen that *dou* does not have to be adjacent to the NP it quantifies over though it apparently cannot quantify an NP across a sentence boundary, (as shown in (4b) (see Chiu (1993)). This however, is not strictly correct, as we can see in (9a) below. When an NP is topicalized from an embedded sentence, *dou*-quantification of the NP is still legitimate even across a sentence boundary.

(9) a. neixie   xuesheng,   wo xiangxin lisi   *dou* hen   xihuan e,
         those   student   I   believe   Lisi   all   very like

   'All those students, I believe Lisi likes them.'

   b.*neixie   xuesheng,   wo *dou* xiangxin lisi   hen   xihuan e,
      those   student   I   all   believe   Lisi   very like

   'All those students, I believe that Lisi likes.'

However, the contrast between (9a) and (9b) shows that when *dou* and the topicalized NP are not base-generated in the same clause, *dou* cannot quantify over the topic. In (9a), *dou* and the topic both originate from the embedded clause. In contrast, *dou* is base-generated in the matrix whereas the topic is from the embedded clause in (9b). (10b–c) further support this generalization.

(10) a. neixie   xuesheng zhangsan zhidao hufei zui
         those   students   Zhangsan   know   Hufei most

   yonggong
   hard-working

   'Those students, Zhangsan knows that Hufei is the most hard-working one.'

   b.*neixie   xuesheng zhangsan zhidao hufei *dou* zui
      those   students   Zhangsan   know   Hufei all   most

   yonggong
   hard-working

   'All those students, Zhangsan knows that Hufei is the most hard-working one.'

c.* neixie xuesheng zhangsan *dou* zhidao hufei zui
    those students Zhangsan all know Hufei most

yonggong
hard-working

'All those students, Zhangsan knows that Hufei is the most hard-working one.'

Examples in (10) involve the so-called "aboutness" topics. The topic is not associated with a gap. Instead, the comment sentence conveys something about the topic. In these cases, there is a superset-subset relationship between the topic and the embedded subject *Hufei*. Regardless of whether *dou* is generated in the matrix or the embedded clause, *dou* cannot quantify over the topic. In other words, given the data we have seen so far, for *dou* to quantify over a topic (i.e., long-distance quantification) *dou* and the topic have to originate in the same clause. This will rule out (10b–c) also. We will come back to how this should be accounted for.[6]

A reviewer notes that there appear to be examples which show that *dou* quantifies over an aboutness topic, as in (11a, b)–(12):[7]

(11) a. neixie xuesheng, pinde (*dou*) bu cuo
      those student character all not bad

      'Those students, the character of each of them is not bad.'

   b. neixie shu, shushen (*dou*) hen da
      those trees trunk all very big

      'Those trees, the trunk of each of them is very big.'

(12)   neixie xuesheng, zhangsan renwei pinde (*dou*) bu
      those student Zhangsan think character all not

cuo
bad

      'Those students, Zhangsan thinks that the character of each of them is not bad.'

Note however that the examples in (11) and (12) do not show that *dou* in fact quantifies over the topic. Let us first consider (11a). The interpretation of the sentence is essentially as follows: 'as for those students, the character of each of them is not bad'. It is hard to tell whether or not *dou* quantifies over the topic or the subject. In particular, these are typical examples of the so-called *Double-subject Construction* (see Teng (1974), Li and Thompson (1981), Tsao (1990) and Lu (1994), among others).

Examples such as (13) and (14) are common examples of double-subject

constructions. The relationship between the first NP and the second NP is usually a part-whole (inalienable) relationship.

(13)   hufei tou   hen   teng
        Hufei head   very ache

        'Hufei has a headache.'

(14)   hufei yanjing hen   da
        Hufei eye   very big

        'Hufei's eyes are very big.'

Lu (1994) considers the first NP the topic and the second NP the subject. Moreover, the second NP has a pro, which is linked with the topic. Thus, (13) has this interpretation: 'as for Hufei, his head aches'.

   Now we turn back to the sentences in (11) and (12). Take (11a) for example: consider first the interpretation of the sentence without *dou*. According to Lu's analysis, the sentence has this interpretation: 'as for those students, their characters are not bad'. With the distribution of *dou*, the interpretation of the sentence will be: 'as for those students, the character of each of them is not bad'. In other words, we do not need to resort to the quantification of the topic to account for the headings of the sentences noted. Hence, there is no evidence that *dou* quantifies over the topic.

2.3. Wh-*words and* dou

Wh-words such as *shei* 'who' and *shenme* 'what' can also be quantified by *dou*. When this happens, they are no longer interpreted as interrogative words. Instead, they are interpreted as universal quantifiers, shown in (15) (see Huang (1982), Cheng (1991) and Li (1992), among others, for a detailed discussion of the interpretation of *wh*-words in Chinese).

(15) a. shei   *dou*   hui   lai
        who   all   will come

        'Everyone will come.'

    b. zhangsan   *shenme*   dou   chi
       Zhangsan   what   all   eat

       'Zhangsan eats everything.'

   We can see in (15) that *shei* 'who' is interpreted as "everyone' and *shenme* 'what' is interpreted as 'everything'. I will assume following Cheng (1991) that *wh*-words in Chinese are variables which need to have a binder.

Also, they are polarity items which require a licenser. In the cases involving *dou*, *dou* functions as both a licenser and a binder. Note that in (15b), *shenme* 'what' has been preposed from its typical object position to a position preceding *dou*.

The quantification between *dou* and a *wh*-word is somewhat different from the quantification between *dou* and a non-interrogative NP. Let us first consider both types of NPs in the same environment: a sentence consisting of two "eligible" NPs preceding *dou* (i.e., NPs that can be quantified by *dou*). Both (16) and (17) consist of two "eligible" NPs preceding *dou*. The former involves non-interrogative plural NPs and the latter, *wh*-phrases. (16) has the two interpretations as shown in (16a) and (16b).[8] That is, it is possible for *dou* to quantify either the subject or the topic.[9] In (17), however, only one of the *wh*-words can be quantified by *dou*. In fact, only the closest one to *dou* can be interpreted as a universal quantifier.

(16)   neixie   shu   women   *dou*   kan-guo
         those   book   we   all   read-ASP

         a.   'All of those books, we have read.'
         b.   'We all have read these books.'

(17)   shei   shenme   *dou*   chi
         who   what   all   eat

         a.   'Who eats everything?'
         b.   '*What does everyone eat?'
         c.   '*Everyone eats everything.'

(17a) shows that the *wh*-word *shei* 'who' is interpreted as an interrogative word while the *wh*-word *sheme* 'what' is interpreted as a universal quantifier. (17b) shows that it is not possible for *dou* to bind *shei* 'who' crossing *shenme* 'what'. This is exactly what happens in the case of (16).

2.3.1. *Binding Across Islands*

We have seen "long-distance" cases of *dou*-quantification above, but they involve topics which originate in the same sentence as *dou*. Besides these long-distance cases, there are also cases involving non-topics.[10] Consider the sentences in (18)–(19).

(18)   [$_{CP}$ Lisi   chi   shenme]   *dou*   gen   wo   wuguan
             Lisi   eat   what   all   to   I   irrelevant

       'Whatever Lisi eats is irrelevant to me.'

(19)   [_NP shei xie   de shu] wo *dou* kan
             who write DE book I   all   read

       Lit. 'I read books that whoever wrote.'
       'For all x, x wrote books, I read them.'

As we can see in (18) and (19), the *wh*-word in the sentential subject or
relative clause does not have an interrogative interpretation. Instead, it
has a universal interpretation. The *wh*-word in both cases is in an island.
(20) is even more surprising.

(20)   [_CP hufei qu bu   qu] *dou* hao
             Hufei go not go   all   good

       Lit. 'Whether or not Hufei is going is good.'
       'Either Hufei is going or Hufei is not going and both options
       are fine.'

In (20), *dou* does not seem to be quantifying over an NP. Instead, it is
quantifying over propositions. The sentential subject in (20) is a yes-no
question. However, when it is quantified by *dou* the interrogative inter-
pretation disappears. In all these cases, *dou* appears to be able to bind a
wh-word in an island. This is impossible if the NP in question is not an
interrogative NP, as we can see in (21).

(21) a.*[_CP tamen chi   mian] *dou* gen wo wuguan
              they   eat   noodle all   to   I   irrelevant

       'That all of them eat noodles is irrelevant to me.'

     b.*[_NP tamen xie   de nafeng xin] wo *dou* kan
              they   write DE that   letter I   all   read

       Lit. 'I read that letter which all of them wrote.'
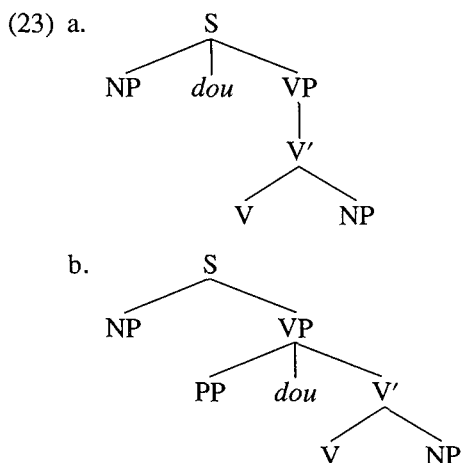

3. *DOU* AS A QUANTIFICATIONAL ADVERB

The adverbial status of *dou* has long been assumed (see Chao (1968),
Alleton (1972), Lü (1980), among others). Based on the adverbial status
of *dou*, Lee (1986) proposes formal requirements on the quantification of
dou. I will first briefly review Lee's account and discuss some problems
that his proposal encounters. In section 3.2, I discuss different types of
adverbs in Chinese so that we can see which type *dou* falls into. I then
propose an analysis of *dou*-quantification and discuss its consequences
and predictions.

3.1. *Lee's (1986) Analysis*

Lee (1986) proposes that *dou* is a dual status adverb. It is either a senten-
tial adverb or a predicate adverb. Further, it is subject to a co-indexation
rule, stated in (22).[11] The element that is coindexed with *dou* is quantified
by it.

  (22)   *Dou*-coindexing
          Coindex with *dou* any leftward constituent it m-commands.

As a sentential adverb, it is adjoined to S, and as a predicate adverb, it is
adjoined to VP, as shown in (23).

(23) a.

```
              S
        ┌─────┼─────┐
       NP    dou    VP
                     │
                     V′
                   ┌──┴──┐
                   V     NP
```

   b.

```
               S
          ┌────┴────┐
         NP         VP
               ┌────┼────┐
              PP    dou   V′
                        ┌──┴──┐
                        V     NP
```

We can see how this analysis accounts for the blocking effect by a *ba*-phrase.
When *dou* follows a *ba*-phrase (which is assumed to be a PP in this account),
it has to be a VP-level adverb. As shown in (23b), in this configuration
dou cannot m-command the subject NP and thus cannot be coindexed with
it. On the other hand, when *dou* appears before the *ba*-phrase, it is an
S-level adverb. It can then m-command the subject NP and coindex with
it. This analysis also accounts for the ungrammatical long-distance cases
(e.g. *dou*, is in an embedded clause, and the target NP is a subject of the
matrix) since m-command will never be achieved. However, it will also
rule out grammatical long-distance cases, for instance, cases involving
topicalization.
    Chiu (1990, 1993) discusses the problem of the co-indexation rule in Lee
(1986). In particular, Chiu points out that it does not rule out problematic
cases such as the ones in (24)–(26). These all involve a target NP in an
island.

(24)   = Chiu (1993, p. 192, ex. 34)

    *[$_{CP}$ Akiu du   zhexie shu] *dou* zui   heshi
        Akiu read these   book all   most appropriate

    'It is most appropriate that Akiu read all these books.'

(25)   = Chiu (1993, p. 192, ex. 35)

    *[$_{CP}$ tamen renshi-guo_] de neige ren   *dou* lai-le
         they   know-ASP   DE that   person all   come-LE

    'The person who they all know came.'

(26)   = Chiu (1993, p. 192, ex. 36)

    *[$_{CP}$ tamen-de baba] *dou* hen   you   qian
         they-DE   father all   very have money

    'Their$_i$ father all$_i$ have money.'
    (also ok with the interpretation: 'Their fathers$_i$ all$_i$ have money.'

In all these cases, *dou* is able to m-command the NP that it is supposed to quantify over. However, as the data indicate, these NPs cannot be quantified over by *dou*. Hence, the Dou-coindexing Rule as stated cannot account for the whole range of data. It should be noted though that the data shown in (24)–(26) resemble the data we have seen earlier. The legitimate cases we have involving *wh*-words show that it is not absolutely impossible for *dou* to quantify over an NP inside an island. I will come back to this contrast below.

3.2. *The Adverbial Status of* Dou

As mentioned above, *dou* has usually been listed within the adverbial class until quite recently. Recently works on floating quantifiers raise doubt on the adverbial status of *dou*. I will briefly review the argument that Chiu has against Lee's adverbial analysis of *dou*. I will show here that the argument put forth in Chiu is quite inadequate if we look closely into the distribution of adverbs in general.

    Chiu (1990, 1993) claims that Lee's treatment of *dou* as an adverb cannot be right because it does not have adverbial distributions. The problematic data in Chiu is repeated below.

(27)   from Chiu (1993, p. 190)

    a. zhexie shu   lisi dagai   meiyou   du-guo
       these   book Lisi probably not-have read-ASP

    'Lisi probably hasn't read these books.'

b. zhexie shu   lisi   *dou* meiyou   du-guo
   these   book   Lisi   all   not-have read-ASP

'Lisi hasn't read all these books.'

c. zhexie shu   dagai   lisi   meiyou   du-guo
   these   book   probably Lisi   not-have read-ASP

'Lisi probably hasn't read these books.

d.*zhexie shu   *dou* lisi   meiyou   du-guo
   these   book   all   Lisi   not-have read-ASP

'Lisi hasn't read all these books.'

Chiu's reasoning is as follows: *dagai* 'probably' is an adverb and if *dou* is also an adverb, it should share the distribution of *dagai*. (27a) and (27c) show that *dagai* can appear right after a subject or between a topic and a subject. However, even though *dou* can appear right after a subject NP (27b), it cannot appear between a topic and a subject (27d). Thus, for Chiu, *dou* cannot be an adverb.

This however is not a valid argument. Previous works on adverbs (Jackendoff (1972, 1977) among others) have shown that there are different types of adverbs with respect to their distribution, agent-orientation, subject-orientation, etc. Hence it is clear that adverbs do not all share the same distribution contrary to Chiu, (1990, 1993) assumption. I show below that *dagai* 'probably' and *dou* 'all' belong to different types of adverbial class with different distributional patterns and thus that Chiu's argument cannot stand.

3.2.1. *Li and Thompson's (1981) Classification*

Li and Thompson (1981) divide adverbs into two classes, namely movable adverbs and nonmovable adverbs. They define the movable adverbs as the ones that can appear at the beginning of a sentence or after the subject of a sentence. These adverbs modify the entire sentence. The nonmovable adverbs only occur after the subject.[12] We will briefly discuss both types with emphasis on the second type since *dou*, as will see, belongs to the class of nonmovable adverbs.

Movable adverbs are divided into two types: time adverbs and attitude adverbs. The latter "denote the speaker's attitude toward or evaluation of the event expressed by the sentence" (Li and Thompson (1981), p. 321). (28)–(29) are examples from Li and Thompson (1981).

(28) a. jintian wo bu   shufu
        today   I   not comfortable

        'Today I don't feel well.'

     b. wo jintain bu   shufu
        I   today   not comfortable

        'Today I don't feel well.'

(29) a. xianran   zhangsan bu   gaoxing
        obviously Zhangsan not happy

        'Obviously, Zhangsan is not happy.'

     b. zhangsan xianran   bu   gaoxing
        Zhangsan obviously not happy

        'Obviously, Zhangsan is not happy.'

Jintian 'today' and *xianran* 'obviously' are both movable adverbs and as such can appear at the beginning of the sentence ((28a) and (29a)) or after the subject ((28b) and (29b)). Other time adverbs include *qunian* 'last year', *jinlai* 'recently' and *zhanshi* 'temporarily'.[13] Other examples of attitude adverbs are *yexu* 'perhaps', *dagai* 'probably', and *dangran* 'of course'.

Nonmovable adverbs are divided into two subgroups, manner and nonmanner adverbs. I will discuss only nonmanner adverbs here to show their distributional patterns. First, as Li and Thompson indicate, these adverbs cannot appear at the beginning of the sentence, as shown in (30b).

(30) a. zhangsan yijing   hui   jia   le
        Zhangsan already return home ASP

        'Zhangsan has already returned home.'

     b.*yijing   zhangsan hui   jia   le
        already Zhangsan return home ASP

        'Zhangsan has already returned home.'

Dou is not a time adverb or attitude adverb, and it cannot appear before the subject. It is thus not a movable adverb. *Dou* falls within the class of nonmovable adverbs, like *yijing* 'already'. The contrast shown in (27) (from Chiu (1990, 1993)) between the adverb *dagai* 'probably' and *dou* 'all' is thus not surprising at all since the former is a movable adverb, based on its possible pre-subject occurrence. The ungrammaticality of (27d) should thus be treated on a par with the ungrammaticality of (30b).

Further, there are differences among these adverbs in terms of distribution. For instance, manner adverbs have subgroups with respect to their distribution (see Li and Thompson (1981)). Hence *dou* does not necessarily share the same distribution with *yijing* "already'. However, the adverb *ye* 'also' is quite similar to *dou* in its distribution. Consider the following examples of *ye* 'also'.[14]

(31) a. zhangsan *ye*   ba   xuesheng   ma-ku   le
        Zhangsan   also   BA   student   scold-cry   ASP

        'Zhangsan also made the student cry by scolding them.'

    b. zhangsan   ba   neige   xuesheng   *ye*   ma-ku   le
        Zhangsan   BA   that   student   also   scold-cry   ASP

        'Zhangsan made *that student also* cry by scolding him/her.'
     * 'Zhangsan also made that student cry by scolding him/her.'

(31a)–(31b) show that *ye* is the same as *dou* with respect to the *ba*-phrase. As shown in the contrast between (31a) and (31b), when *ye* appears before the *ba*-phrase, it modifies the subject NP. On the other hand, when *ye* appears after the *ba*-phrase, it can only modify the NP in the *ba*-phrase. In other words, the modification relationship between *ye* and an NP is also blocked by a *ba*-phrase.

3.2.2. *The Position of* Dou

Let us now turn to the positions in which *dou* can occur. I follow Travis (1988) in claiming that adverbs do not project to a maximal projection. They can be either X′ or X°. Further, due to their "defective" nature, they are not licensed in the same way that maximal projections are. Rather, they are licensed by a head feature (for instance, the feature of a verb). Due to their defective nature, they are adjoined only to X°s or X′s.[15] *Dou*, as an adverb, is thus adjoined to an X′ or X°. The question that arises is this: which heads license *dou*? Based on its distribution, I propose that heads with verbal features can license *dou*. Taking Grimshaw's (1991) view that functional projections such as TenseP and AgrP are extended projections of a verb, they also share with verbs the verbal features. Hence, *dou* can be licensed by a verb or by any extended verbal projections. Let us consider a simple structure such as (32), assuming that Chinese has Aspect Phrase (AspP) rather than IP due to the lack of inflections.

(32)
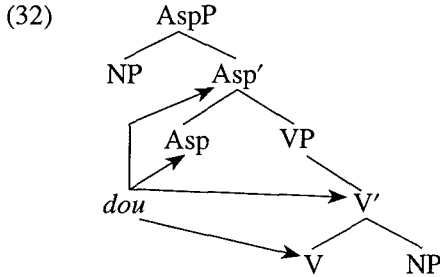
The structure in (32) indicates that *dou* can be adjoined to Asp′ and Asp°
as well as V′ and V°. All adjunctions are to the left, as other adverbs are.
Note that *dou* cannot appear between the verb and the NP. However, this
is not particular to *dou*. Rather, it is the property that all adverbs in Mandarin
Chinese share.

In sentences with more complex structures, the adverbial analysis of
dou gives the correct predictions, in contrast with the floating quantifier
analysis of *dou* proposed in Chiu (1990) (see section 5 for a discussion).
Consider for instance sentences with a resultative complements such as (33).

(33) a. tamen *dou* qi   ma   qi   de hen lei
         they   all ride horse ride DE very tired

      b. tamen qi   ma   *dou* qi   de hen lei
         they ride horse all ride DE very tired

      c. tamen qi   ma   qi   de *dou* hen lei
         they ride horse ride DE all very tired

         'All of them got very tired because of horse-back riding.'

In (33), we see that *dou* can be in three different positions and still modify
the subject NP. Following Huang (1992), I assume that these resultative
sentences have the following structure:

(34)
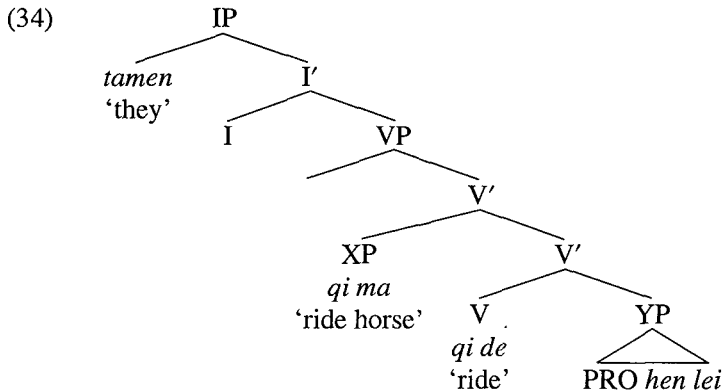
In (34) the XP *qi ma* 'ride horse' is the reduplicative XP (may be a VP). The actual verb is the one following this reduplicative XP. Assuming that *dou* is an adverb which adjoins to an X', we can see that it can adjoin to either I', the first V', the second V', or an X' inside YP. The first two adjunction sites cannot be distinguished here since there are no extra elements between *tamen* 'they' and *qi ma* 'ride horse'. (33a) is thus a result of either adjunction of *dou* to I' or to the first V'. (33b) is a result of adjunction of *dou* to the second V'. And (33c) arises when *dou* is adjoined to an X' inside YP.

3.3. *Deriving the Interpretation of NP Modified by* Dou

Given the analysis of *dou* as an adverb, the question we need to address is how *dou* quantifies over an NP and how the NP is interpreted. The question is certainly valid not only for analyses which treat *dou* as an adverb but also for a floating quantifier analysis of *dou*. In particular, since the interface level in question is Logical Form (Chomsky (1992), among others), the question can be rephrased as how *dou* and its target NP get interpreted at LF. We have seen that *dou* can be generated non-adjacent to the NP it quantifies over. It is thus crucial to see how the NP gets quantification from *dou*. I will first discuss the quantification of non-interrogative NPs.

Following Heim, Lasnik, and May's (1991) (henceforth HLM) analysis on *each* in English, I propose that at LF *dou* adjoins to the NP it quantifies over. In essence, I am treating *dou* also as a distributor. HLM discusses an observation of Bennett (1974) regarding the distributor parts of reciprocal phrases (i.e., *each* in *each other*). The distributor parts "introduce a universal quantification, whose values are restricted to individuals falling under the collective denotation of the antecedent . . ." (HLM, p. 67). The interpretation of *dou* clearly shows that it is distributive, as claimed in Lee (1986), which I will briefly recapitulate here.

Lee (1986) tests the distributivity of *dou* using symmetric predicates. If a quantifier can appear with symmetric predicates, it is a non-distributive quantifier; if it cannot appear with symmetric predicates, then it is a distributive quantifier. In English, even though *all*, *each*, and *both* require semantically non-singular antecedents, they are different when symmetric predicates are involved, as shown in (35) (from Lee (1986)).[16]

(35) a. The men *all* met at noon.
     b.*The men *each* met at noon.
     c.*The men *both* met at noon.

All can occur with symmetric predicates like *meet* while *each* and *both*

cannot. Hence *each* and *both* are considered distributive quantifiers. Similar examples with *dou* can be found. Crucially, the following examples from Lee (1986) show that the sentences involving *dou* are grammatical only when the NP quantified by *dou* is interpreted distributively (i.e., the members of the set denoted by the NP do not hold the relationship indicated by the predicate; see Lee (1986) for a more detailed discussion).

> (36)   = Lee (1986, pp. 58, 177)
>
>   a. Zhangsan he   Mali mingtian   jiehun
>   Zhangsan and   Mali tomorrow   marry
>
>   'Zhangsan and Mary will marry tomorrow.'
>
>   b. Zhangsan he   Mali *dou* mingtian   jiehun
>   Zhangsan and   Mali all   tomorrow   marry
>
>   'Zhangsan and Mary will both marry (with someone else) tomorrow.'
>
> (37) a. women heyong yi-ge   chufang
>   we   share   one-CL   kitchen
>
>   'We share a kitchen.'
>
>   b. women *dou* heyong yi-ge   chufang
>   we   all   share   one-CL   kitchen
>
>   'We each share a kitchen (with someone else).'

(36a) and (36b) differ crucially in that the latter implies that *Zhangsan* and *Mary* are not marrying each other whereas (36a) can also have the interpretation in which *Zhangsan* and *Mary* are going to marry each other. Similarly, (37b) can only be interpreted as 'we are in the same situation: sharing a kitchen with someone else'. The distributive nature of *dou* can account for the above contrast.

I also assume following HLM that after *dou* adjoins to an NP (e.g., a plural NP), the whole complex undergoes Quantifier Raising (henceforth QR). In essence, the NP is turned into a quantifier by *dou*, and, being a quantifier, the [NP + *dou*] complex undergoes QR. This generates a variable for the quantificational NP to bind. (38b) is an LF representation of (38a). *Dou* further undergoes QR, and the result can be mapped onto a tripartite structure indicated in (38c) with a quantifier, a restriction, and a nuclear scope with a variable in it.

(38) a. neixie   xuesheng *dou* lai-le
         those   students   all   come-ASP

     'All those students came.'

  b. [[those students] all$_i$]$_j$ t$_j$ t$_i$ came

  c. ∀ x, x = those students, x came

In short, I claim that *dou* is like the distributor *each* in English in that it adjoins to the NP it quantifies over at LF. The movement of *dou* is on a par with adjunct movements since it is an adverb. In other words, the movement of *dou* needs to satisfy conditions on movement. One immediate prediction resulting from this movement analysis of *dou* is that *dou* can quantify only an NP to its left, assuming that movement is always raising and that there is no lowering or leftward movement (Kayne (1993)). Hence, given this analysis, characteristics listed earlier in (1)–(2) naturally follow.

3.4. *Deriving the Locality Restrictions on* Dou

Let us first consider simple sentences without a topic. Recall that *dou* quantifies over a subject, as shown in (39).

(39)   tamen *dou* hui   jia   le
        they   all   return home ASP

        'All of them has returned home.'

Assuming that in (39), *dou* is adjoined to Asp', the movement of *dou* to the subject NP *tamen* 'they' at LF leaves behind a trace that can be antecedent-governed. I adopt the segment theory of adjunction in May (1985) and Chomsky (1986) (i.e., the NP that *dou* is adjoined to does not dominate *dou*, though it contains *dou*). We will discuss other sentences without a topic in section 3.4.1 when we discuss blocking effects in simple sentences.

We turn now to sentences with a topic, including long-distance cases. Recall that *dou* can quantify over a topic if the topic and *dou* originate from the same sentence. Furthermore, topics that are not linked with a gap in a sentence cannot be quantified by *dou*. The relevant examples are repeated below:

(40) a. zhexie   xuesheng wo *dou* xihuan.
        these   students   I   all   like

        'I like all of these students.'

b. neixie xuesheng wo xiangxin lisi *dou* hen xihuan.
   those   student   I   believe   Lisi all   very like

'Those students, I believe Lisi likes them all.'

c.*neixie xuesheng wo *dou* xiangxin lisi hen xihuan
   those   student   I   all   believe   Lisi very like

'All those students, I believe that Lisi likes.'

d.*neixie xuesheng zhangsan zhidao hufei *dou* zui
   those   students Zhangsan know   Hufei all   most

yonggong
hard-working

'All those students, Zhangsan knows that Hufei is the most
hard-working one.'

Given (40a), we might say that *dou* can adjoin to the topic NP, and thus
quantification by *dou* is legitimate. However, if this were the case, (40c–d)
could not be ruled out. Thus it appears that *dou* cannot simply adjoin to
the topic NP (as a result of an intervening AspP) Instead, I suggest that
(40a) should be treated on a par with (40b). Whatever allows *dou* to quantify
over a long-distance topic also allows it to quantify over a short-distance
topic.

To see how *dou* quantifies over a topic, consider the difference between
(40b) and (40d): the former has a gap while the latter does not. the question
that arises here is whether or not the gap is a result of movement. Following
Xu and Langendoen (1985) among others, I assume that topicalization in
Mandarin Chinese is in fact left-dislocation.[17] That is, the topic is a left-
dislocated NP associated with a resumptive pronoun in the sentence. In
the cases we have seen, the resumptive pronoun is a pro. Further, I follow
Demirdache (1991) in assuming that a resumptive pronoun moves at LF
because resumptive pronouns are in-situ operators.[18] In the cases we are
considering, I assume that the resumptive pronoun simply adjoins to the
lowest AspP dominating it (it is the first operator position).[19] After the
resumptive pronoun adjoins to the lowest AspP at LF, *dou* then adjoins to
the resumptive pronoun. (41) shows the LF representations of (40a)–(40c).
((40d) does not have a resumptive pronoun since it is a gapless topic con-
struction.)

(41) a. [$_{CP}$ zhexie xuesheng [$_{ASPP}$ [pro$_i$ *dou*$_j$] [$_{ASPP}$ wo t$_j$ xihuan t$_i$]]]
        these   students   all   I   like

b. neixie xuesheng [$_{ASPP}$ wo xiangxin [$_{ASPP}$ [pro$_i$ *dou$_j$*]
   those   student   I   believe   all

   [$_{ASPP}$ lisi t$_j$ hen   xihuan t$_i$]]]
       Lisi   very like

c.* neixie xuesheng [$_{ASPP}$ wo *dou* xiangxin [$_{ASPP}$ [pro$_i$]
    those   student   I   all   believe

   [$_{ASPP}$ lisi hen   xihuan t$_i$]]]
      Lisi   very like

Since the resumptive pronoun only moves to adjoin to the lowest AspP, *dou* in (40c) does not have anything to quantify over, and thus the sentence is ruled out due to vacuous quantification of *dou*. On the other hand, for both (40a) and (40b), *dou* is able to adjoin to the resumptive pronoun which is adjoined to AspP, and hence the quantification on *dou* is satisfied (due to the fact that *pro* in these cases has a plural antecedent). Given this account, the movement of *dou* is fairly local. In particular, it does not cross an AspP boundary (and thus cannot directly quantify over a topic). Note that we have mentioned earlier that after the initial movement of *dou* to adjoin to an NP, *dou* later undergoes QR (to generate a proper tripartite structure). Since QR is assumed to be local movement (never crossing and IP/AspP), it appears to be the case that all movements of *dou* are local.
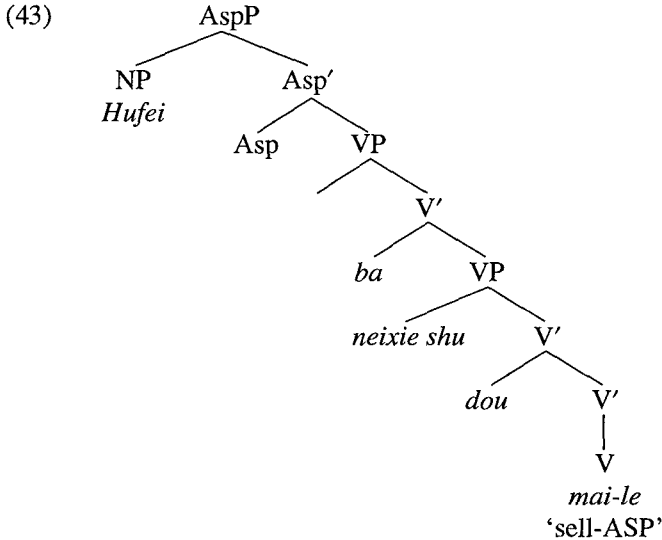
3.4.1. *Blocking Effects*

We have seen that even though *dou* can quantify over a subject, there are "blockers" which prevent this from happening. In this section, we will discuss the blocking effect by a *ba*-phrase and a *bei*-phrase in contrast with the lack of blocking effect with propositional phrases. Blocking effects associated with *wh*-phrases will be discussed in section 4.

(42) a. hufei ba   neixie shu   *dou* mai-le
        Hufei BA   those   book all   sell-ASP

    'Hufei sold all those books.'

   b.* tamen ba   neiben shu   *dou* mai-le
      they   BA   that   book all   sell-ASP

    'All of them sold that book.'

To recapitulate, as the contrast in (42) shows, *dou* can quantify over the

NP associated with *ba* if it is a plural NP. However, with the presence of a *ba*-phrase, *dou* cannot quantify over the subject even if it is a plural NP.

To see how the blocking effects works, we need to first understand how *dou* can quantify over a *ba*-NP. The quantification of a *ba*-NP may be problematic if we treat a *ba*-phrase as a prepositional phrase. However, as Huang (1992) shows, the NP in the *ba*-phrase is capable of controlling a PRO in a complex predicate structure. It must be able to c-command it. The structure of (42a) is thus something like (43):[20]

(43)

```
                 AspP
              ___/  \___
           NP            Asp'
         Hufei          /  \
                     Asp    VP
                            / \
                             V'
                            /  \
                          ba    VP
                               /  \
                        neixie shu   V'
                                    /  \
                                  dou    V'
                                         |
                                         V
                                      mai-le
                                    'sell-ASP'
```

Given the structure in (43), *dou* can adjoin to the "ba-NP", and this movement is comparable to cases of *dou*-quantification of subjects.[21]

Consider now the ungrammatical (42b). I will show that the apparent blocking effects (and thus the ungrammatical (42b)) can be accounted for by the Principle of Economy of Derivation (Chomsky (1991)). In particular, I propose that the blocking effect is a result of a tension between the requirement of *dou* to quantify over a plural NP and the Principle of Economy of Derivation. The requirement on *dou* simply states that it needs to quantify over a plural NP. This requirement triggers *dou* to move to an NP.[22] (42a) satisfies not only the Principle of Economy of Derivation by moving *dou* to the closest NP (i.e., making the shortest move) but also the quantificational requirement of *dou*. However, if the NP closest to *dou* is not a plural NP as in (42b), the quantificational requirement of *dou* cannot be satisfied, and thus the derivation crashes (even though it satisfies the economy of derivation).

The situation with a *bei*-phrase is similar. As we have seen earlier,

a *bei*-phrase generates similar blocking effects (examples from (8) below).

(8) a. neixie xiaohai √ bei lisi * qi-fu-guo
         those   children BEI Lisi   bully-ASP

         'Those people were bullied by Lisi.'

     b. zhangsan bei *zhexie laoshi* *dou* ma-guo
         Zhangsan BEI these   teacher all   scold-ASP

         'Zhangsan has been scolded by all these teachers.'

Tsai (1993) argues that *bei* is ". . . a two-place predicate, taking a Patient as its external argument and a proposition as its complement. . . . The interpretation of 'NP *bei* VP' would be 'NP suffer from something corresponding to VP'. (p. 227) Tsai considers *bei* a Modal. Consider the structure of (44) in (45).[23]

(44)   (from Tsai 1993, p. 227)

        lisi bei [CP akiu da-le   san-zhi   quanleida]
        Lisi BEI   Akiu hit-ASP three-CL home run

        'Lisi suffered from Akiu's hitting three home runs.'

(45)   AspP
              ┌────────┴──────┐
           List   . . . Mod'
                         ┌──────┴──────┐
                       Mod   VP
                       bei   ┌────┴────┐
                               Akiu   V'
                                       ┌────┴────┐
                                       V   VP
                                            ┌────┴────┐
                                                     V'
                                              ┌───────┴───────┐
                                              V   NP
                                           da-le   *san-zhi quanleida*
                                           'hit-ASP'   'three-CL home run'
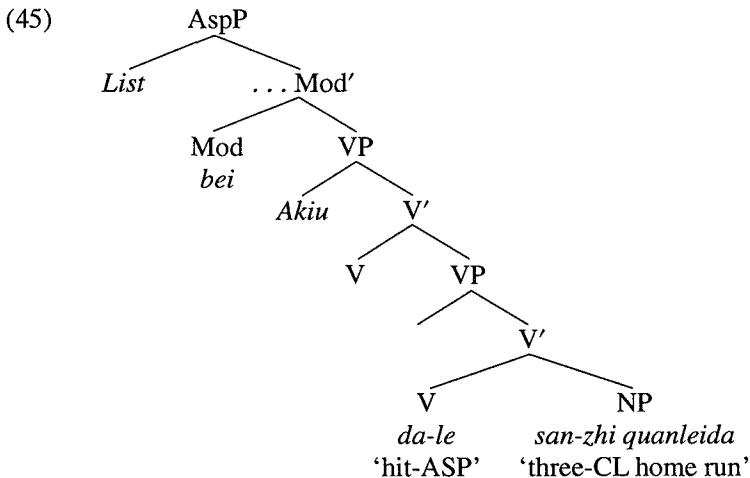
In a sentence such as (44), it is quite clear that no movement of NP is involved in forming a *bei*-phrase. If we assume such a structure of *bei*-phrases, it follows that a *bei*-phrase will create the same blocking effects as a *ba*-phrase. The NP below *bei* is accessible to *dou* if the latter is generated below this NP rendering the blocking effect. The sentences in (8) are thus accounted for on a par with sentences with a *ba*-phrase.

Typical PP's however are not like *ba*-NPs and *bei*-NPs in that they do not block *dou* quantification. In (46)–(48), we see that (i) *dou* can quantify over an object of a preposition and (ii) *dou*, when occurring after a PP, can quantify over the subject. Thus, there appears to be no blocking effect associated with PPs.

(46) a. hufei [_{PP} gen   zhexie yinhang] *dou* qian-le   hetong
        Hufei   with these   bank   all   sign-ASP contract

        'Hufei has signed contracts with each of these banks.'

     b. zhe sanjia   gongshi [_{PP} gen Meiguo   yinhang] *dou*
        this three-CL company   with American   bank   all

        qian-le   hetong
        sign-ASP   contract

        'These three companies have all signed contract(s) with the Bank of America.'

(47) a. wo [_{PP} gei tamen] *dou* xie-le   xin
        we   to   they   all   write-ASP letter

        'I have written a letter/letters to each of them.'

     b. women [_{PP} gei lisi] *dou* xie-le   xin
        we   to   Lisi all   write-ASP letter

        'We all have written (a) letter to Lisi.'

(48) a. guojing [_{PP} dui women] *dou* hen   hao
        Guojing   to   we   all   very good

        'Guojing is very good to me.'

     b. tamen [_{PP} dui wo] *dou* hen   hao
        they   to   I   all   very   good

        'They are all very good to me.'

There are two apparent questions associated with PPs and *dou*: (i) how is the object of a preposition accessible to *dou* (i.e., why does the projection of PP not block *dou* from adjoining to the NP)? and (ii) why is there no blocking effect if the object of the PP is accessible to *dou*? The answers to these two questions are related. Let us first consider the sentences in (48). I suggest that *dui* has a dual status. It can be a dummy Case-marker, which does not project to an XP projection, as proposed in Tsai (1993). This will enable the object of *dui* to be accessible to *dou* and thus account for the grammaticality of (48a). Furthermore, it can also project as a full PP.

In other words, for examples such as (48a–b), there are four possible representations, as shown below:

(49) a. guojing [$_{NP}$ dui women] *dou* hen hao
      Guojing   to   we   all   very   good

       'Guojing is very good to us.'

  a'. guojing [$_{PP}$ dui women] *dou* hen hao
      Guojing   to   we   all   very   good

       'Guojing is very good to us.'

  b. tamen [$_{NP}$ dui wo] *dou* hen   hao
      they   to   I   all   very   good

       'They are all very good to me.'

  b'. tamen [$_{PP}$ dui wo] *dou* hen   hao
      they   to   I   all   very   good

       'They are all very good to me.'

In (49a), *dui* does not project into an XP, and thus *women* 'we' can be quantified by *dou*. By contrast, in (49a'), it projects into a PP, and thus *women* 'we' is not accessible to *dou*. Thus the representation in (49a') is ruled out. Similarly, in (49b) and (49b'), due to the dual projection possibilities for *dui*, the representation in (49b) will be ruled out since the NP *wo* 'I' is accessible to *dou*, and thus, by Economy of Derivation, *dou* will be adjoined to *wo* 'I' without satisfying its quantificational requirement, as in the case of *ba*-NPs.

Consider now the other cases of PPs. Since they pattern just like *dui*, I suggest that they also have dual status. In other words, prepositions in Mandarin Chinese can be either dummy Case-markers without an XP projection or real prepositions projecting a PP. Two questions arise with respect to this claim: (i) why are prepositions so special? (ii) why are prepositions in Mandarin Chinese different from prepositions in languages like English? Below I will briefly discuss possible answers to these two questions.

With respect to projecting an X°, the category *preposition* has always stood out. First, is it a functional or a lexical category? It is certainly more lexical than categories such as Agr or Infl. However, it is more functional than verbs, nouns, and adjectives (Chomsky (1981); see also George (1980), among others). We have assumed that prepositions project the same way other categories project. However, it is unclear whether or not there is a

Spec position associated with PPs. Hence there are good reasons to believe that prepositions are different from other categories in terms of projection. Turning to the second question, essentially we could consider whether or not English prepositions could be simply dummy Case-markers. This would be beyond the scope of this paper. I would nevertheless point out that the category *preposition* in Mandarin Chinese is more controversial than it is in English. There is a class of elements called "coverbs" in Mandarin Chinese (see Li and Thompson (1981) among others). They are called "coverbs" because it is unclear whether they are verbs or prepositions. In other words, it is rather unclear what are the members of the category 'preposition' and how they are different from typical prepositions in other languages. What I have suggested in this paper is that in Mandarin Chinese they have a dual status: they are dummy Case-markers or real prepositions.

4. THE INTERACTIONS BETWEEN *WH*-WORDS AND *DOU*

4.1. *Apparent Adjacency*

We have seen that *dou* does not have to be adjacent to the NP that it is quantifying over though some blocking effects as well as locality effects are observed. However, when the NP is a *wh*-word, a different situation arises. As shown in section 2, on the one hand, *dou* has to be adjacent to the *wh*-word it binds, and, on the other hand, *dou* appears to be able to bind a *wh*-word in an island. Consider first the example mentioned in section 2 (repeated below), which shows that when there are two *wh*-words preceding *dou*, only the closest one can be quantified by *dou*.

(17)   shei   shenme   *dou*   chi
         who   what   all   eat

    a. 'Who eats everything?'
    b.* 'What does everyone eat?'
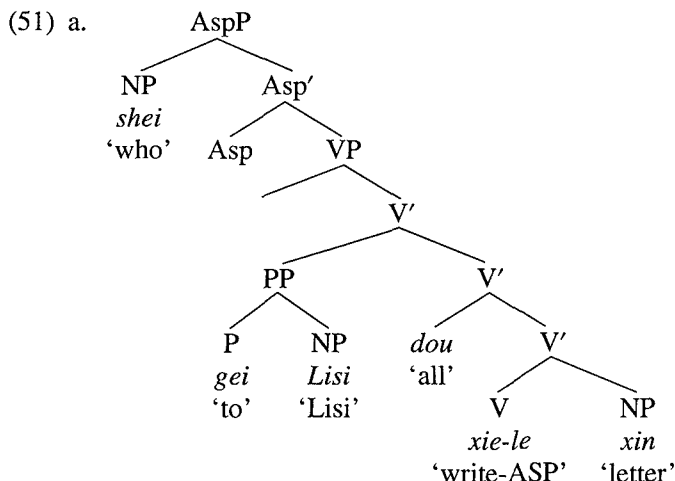   c.* 'Everyone eats everything.'

This adjacency requirement is valid not only when two *wh*-words are involved. In fact, it appears that for *dou* to provide universal force to a *wh*-word, it has to be adjacent to it, regardless of what intervenes between *dou* and the *wh*-word.
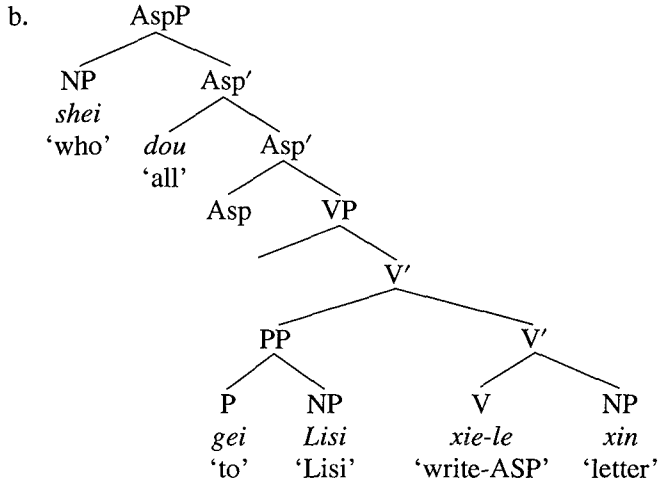
(50) a.* shei   gei   lisi   *dou*   xie-le   xin
         who   to   Lisi   all   write-ASP   letter

    'Everyone wrote a letter to Lisi.'

b. shei *dou* gei lisi xie-le xin

who all to Lisi write-ASP letter

'Everyone wrote a letter to Lisi.'

c.* shei mingtian *dou* lai

who tomorrow all come

'Everyone is coming tomorrow.'

d. shei *dou* mingtian lai

who all tomorrow come

'Everyone is coming tomorrow.'

The PP headed by *gei* 'to, for' in (50a), as well as the time adverbial in (50c), does not normally induce a blocking effect with non-interrogative NPs. However, the examples in (50) show that *wh*-words differ from typical NPs with respect to *dou*-quantification. This difference reflects the inherent difference between *wh*-words and typical NPs. As noted earlier, *wh*-words are variables without quantificational force, and they are polarity items requiring a polarity licenser. I will show below that these inherent properties of *wh*-words contribute to the adjacency requirement.

Let us first consider the binding of *wh*-words, i.e., *dou* contributes universal force to *wh*-variables. The requirement on variables is that they must be bound, and it is possible that this does not need to take place until LF. If this is the case, the binding of *wh*-variables cannot be the deciding factor for the adjacency requirement. Instead, I think that the polarity licensing of *wh*-variables leads to an apparent adjacency effect in some cases. Consider the contrast between (50a) and (50b). The structures of these two sentences are shown in (51a) and (51b).

(51) a.

b.

```
                    AspP
                   /    \
                 NP       Asp'
                shei     /    \
                'who'  dou      Asp'
                       'all'   /    \
                             Asp      VP
                                  \
                                   V'
                                 /    \
                               PP       V'
                              /  \     /    \
                             P    NP  V       NP
                            gei  Lisi xie-le  xin
                            'to' 'Lisi' 'write-ASP' 'letter'
```

In (51a), due to the intervening PP (which is adjoined to V' or VP), *dou*
has to be adjoined to V'. In contrast, since the PP is not intervening between
dou and the *wh*-word in (51b), *dou* can be adjoined to Asp'. As a result,
dou is able to m-command the *wh*-word in (51b). I propose that in order
to license a polarity *wh*-word, the licenser must m-command the polarity
item at S-structure.[24] This is only achieved in (51b). The ungrammaticality
of (50a) is thus a result of the failure of polarity licensing rather than a result
of LF movement of *dou*.

Now let us turn to the situation in which *dou* binds a *wh*-word across
an island, apparently not exhibiting any adjacency effect (see also Cheng
and Huang (1993) for a discussion of a similar type of sentences). If the
adjacency effect is simply a side effect due to the m-command require-
ment of polarity licensing, the example in which a *wh*-word is bound
across an island does not present a problem. Consider an example which
shows that *dou* binds more than one *wh*-word:

(52)   shei chi shenme *dou* gen wo wuguan
        who   eat what   all   to   I   irrelevant

        Lit. 'Whoever eats whatever is irrelevant to me.'
        'Whatever pairs of x and y such that x eats y are irrelevant to
        me.'

This sentence presents two problems for the current analysis. In the account
given so far, *dou* adjoins to the NP it quantifies over at LF. This ensures
that *dou* quantifies one element at a time. However, in (52), not only is
dou binding two NPs at the same time, but these two NPs are also not
"accessible" to *dou* because they are in an island. These problems can be

solved if we consider the quantificational nature of *dou* as well as the inherent properties of the *wh*-words. In the cases where *dou* quantifies over a non-interrogative NP, *dou* is looking for something to define its range, something that it can quantify over. A non-interrogative plural NP satisfies this requirement of *dou* because it provides the restriction for the quantifier, and after QR, the quantifier also has a variable to bind. On the other hand, in the case of *wh*-words, we are dealing with a slightly different scenario. *Wh*-words in Chinese are variables (with restrictions on them). They need to be bound by a quantifier (or a legitimate operator). However, they do not need QR to generate a variable for the quantifier to bind. Hence, it is sufficient if *dou* can be in a position which can bind the *wh*-words. To achieve this, *dou* just needs to appear in a position capable of c-commanding the *wh*-words. In this case, if *dou* can adjoin to the sentential subject, it can bind the *wh*-words. It does not need to actually adjoin to the *wh*-words.[25]

It should be noted that the analysis we have given so far in the cases of *dou* quantifying a non-interrogative element seems to run into contradiction with the non-selective nature of *dou*. However, as we have noted above, the role that *dou* plays when a non-*wh*-NP is involved differs from the role it plays with *wh*-NPs. The non-selective nature of *dou* surfaces only when it is to bind a variable. This arises when *wh*-NPs are involved. On the other hand, when it quantifies over a non-*wh*-NP, it needs to adjoin to the NP to turn the whole NP into a quantificational NP, which subsequently undergoes QR. Hence, *dou* can quantify only one non-*wh*-element at a time.[26]

One interesting question that arises is associated with examples such as (20), repeated below.

(20)   [$_{CP}$ hufei   qu   bu   qu]   *dou*   hao
            Hufei   go   not   go   all   good

Lit. 'Whether or not Hufei is going is good.'
'Either Hufei is going or Hufei is not going and both options are fine.'

In this example, it is clear that *dou* is not quantifying over an NP. Since the sentential subject is a yes-no question, the question that arises is what *dou* actually quantifies over in (20). Following Hamblin (1973) and Karttunen (1977), I assume that a yes-no question such as the one in (20) denotes a set of propositions. (20) denotes a set containing two contradictory propositions, namely "Hufei is going" and "Hufei is not going". From the meaning of the sentence, it is clear that *dou* quantifies over this set of

propositions. It is on a par with quantifying over a plural NP with a conjunction in it:

(53)   zhangsan   he   lisi   *dou*   lai
         Zhangsan   and   Lisi   all   come

         'Zhangsan and Lisi both come.'
         ="For ∀x, x=Zhangsan and Lisi, x comes.'

A yes-no question certainly differs from a plural NP with a conjunction in it in that a yes-no question is a disjunction. What I would like to suggest here is that *dou* quantifies over both members of the disjunction. This is in line with the requirement of *dou* that it has to quantify over plural elements. In this case, it is quantifying over two propositions:

(54)   For ∀x, x=Hufei is going and Hufei is not going, x is irrelevant to me.

In other words, the yes-no question defines the range of things that *dou* quantifies over in (20), namely, Hufei's going and Hufei's not going.[27]

4.2. *Ambiguities Associated with* Wh-*words*

The analysis proposed in this paper also leads to an account for a supposedly surprising difference between *wh*-words and non-*wh*-words, as shown in the contrast between (55) and (56).[28]

(55)   lisi   shei   *dou*   xihuan
         Lisi   who   all   like

         a. 'Lisi likes everyone.'
         b. 'Everyone likes Lisi.'

(56)   Lisi   zhexie   xuesheng   *dou*   xihuan
         Lisi   these   students   all   like

         a. *'Lisi likes all these students.'
         b. 'All these students like Lisi.'

In (55), the *wh*-word can be interpreted either as the logical object of the verb or the logical subject. However, the plural NP *zhexie xuesheng* 'these students' in (56) can be interpreted only as the logical subject. This contrast is surprising if we think only of the quantificational requirement of *dou*. If the *wh*-word in (55) is the logical subject, then Lisi is simply being focalized in the topic position. If the *wh*-word is the logical object, it then moves to the pre-*dou* position so that *dou*'s quantificational requirement

can be satisfied. There does not seem to be any difference when it comes to the sentence in (56). However, if we consider the requirement on the *wh*-words that they need to be bound, the difference exhibited between (55) and (56) can be explained.

Due to their status as variables, the *wh*-words need to have binders; however, the non-*wh*-words do not have such a requirement. In order for *zhexie xuesheng* 'these students' to be interpreted as the logical object in (56), it has to move to the pre-*dou* position to satisfy the quantificational requirement of *dou*. This, however, violates Greed (Chomsky (1991)), which dictates that Last Resort operations are always "self-serving". In other words, for an element to undergo movement, that element itself rather than another element has to benefit. In the case we just mentioned, there is only one reason for the plural NP to move to the pre-*dou* position, namely to satisfy the quantificational requirement of *dou*. On the other hand, if the interpretation is that the plural NP is the logical subject of the sentence, this plural NP does not move at all but the NP *Lisi* moves to the topic position to be focalized. Greed will not be violated in such a case. On the other hand, when a *wh*-word is involved, since it is an element which needs a binder and a licenser, it moves to the pre-*dou* position in order to satisfy its own requirement. And it so happens that after this movement, the quantificational requirement of *dou* can also be satisfied. This therefore does not violate Greed, and both readings of (55) are thus available.

5. CHIU (1993)

5.1. *The Analysis*

Chiu (1993) proposes that *dou* is a head taking an NP/DP complement (as in (57)). To account for the apparent "floating" characteristics of *dou*, she proposes that *dou* must be incorporated into a verbal or inflectional head. This incorporation must be preceded by the extraction of the complement NP/DP of *dou* since the NP quantified by *dou* always precedes *dou* (see the examples in (2)). I will discuss the crucial parts of Chiu's analysis below, in particular, her treatment of subjects and objects with respect to *dou*-quantification.

(57)   DouP
        ⟋＼
           Dou′
         ⟋‾＼
      Dou   *neixie xuesheng*
              'those student'
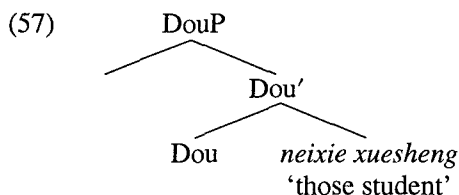
In Chiu's analysis, subjects are base-generated in VP and subsequently moved to Spec of NomP to get Case. Assuming that DouP moves, at any point of the movement, the NP/DP complement of *dou* may move out to continue the journey. After the complement has moved, *dou* can then incorporate into a higher inflectional head. A standard structure assumed in Chiu is (58) (I have taken out some projections that are not relevant for the present discussion; see Chiu (1993) for a detailed tree).

(58)
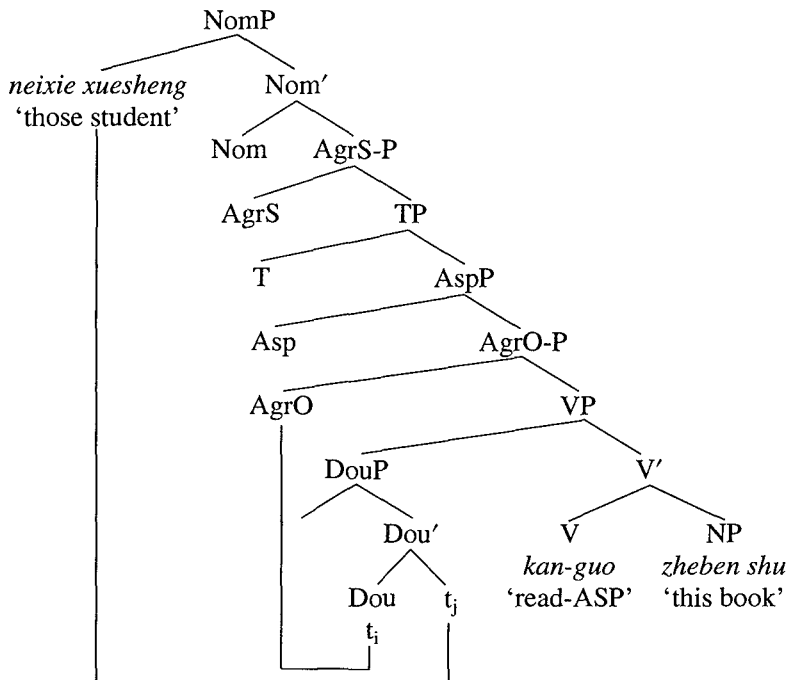
It is possible for the subject DouP to be split up in the way indicated in (58): the complement of DouP moves directly to Spec of NomP, and *dou* can then incorporate into AgrO. This is certainly not the only possibility. According to Chiu, besides AgrO°, Asp° and AgrS° are also possible incorporation sites for *dou*.[29] This can be achieved by assuming that DouP can move to Spec of AgrO and Spec of TP for instance; at each point, it is possible for the complement to move out, and *dou* is then subsequently incorporated into the next higher head.

Dou-quantification of objects differs from that of subjects in that Chiu assumes (as we also have assumed in this paper) that topicalization is left-dislocation. Hence, in a sentence with a topic associated with an object gap, there is a DouP in the object position with a pro in the complement position. This pro must move to Spec of AgrO and thus enables *dou* to

incorporate. Since the landing site of pro is Spec of AgrO, there are only two possible heads for *dou* to incorporate into, namely AgrO and V.

Lastly, to account for the *ba*-phrases, Chiu assumes that the NP associated with *ba* is moved from the object position. As indicated in (59), the object position of the verb is a DouP. The complement of *dou* moves to a preverbal position (which is Case-marked by *ba*). *Dou* then left-adjoins to the verb.

(59)   zhangsan   ba   [$_{NP}$ neixie   shu]$_i$ *dou*$_j$ mai-le $_{DOUP}$[t$_j$ t$_i$]
        Zhangsan   BA   those   books   all   sell-ASP

The blocking effect of a *ba*-phrase is accounted for by assuming that subjects are base-generated in Spec of VP, and thus if *dou* is associated with the subject, it has to be incorporated into a head higher than a verb.

5.2. *Problems with the Analysis*

Aside from the problem that Chiu herself points out regarding her analysis, there are a number of fundamental problems associated with her analysis of *dou*. First, in her analysis, a subject NP has to get Case and hence movement to Spec of NomP. However, in order to get a variety of positions as the landing site of *dou*, Chiu has to allow both DouP and the complement of *dou* (the actual NP/DP which shows up in Spec of NomP) to move for Case reasons. This leads to a question of which XP is actually getting Case. The answer, I think, is apparent since the NP which eventually shows up in Spec of NomP is not a DouP. Then it raises the question of why DouP undergoes movement at all. Assuming the Economy of Derivation (Chomsky (1991)), we will find no reason for DouP to undergo movement. If this is the case, then many landing sites will be unavailable to *dou*.[30]

As noted earlier, Asp° and AgrO are both possible landing sites for *dou*. However, given the system developed in Chiu, both landing sites are problematic. First, AspP is generated directly above AgrO-P. In order for *dou* to incorporate into Asp°, DouP has to move to Spec of AgrO first. This is quite contrary to what we assume about AgrO-P since the DouP in question is associated with a subject NP while AgrO-P is "reserved" for objects. As for AgrO, it is the projection immediately above VP in which the subject DouP is generated. For *dou* to incorporate into AgrO, the DouP has to stay in-situ (i.e., in Spec of VP) while the complement NP/DP moves out. This again raises the question of why DouP sometimes moves for Case reasons and sometimes does not. If DouP can happily stay in Spec of VP, there is no reason for it to move at all. We will then predict

AgrO to be the only position for *dou* to incorporate into. This is certainly not a desirable result.

   Even though Chiu's treatment of topic-objects quantified by *dou* is similar to the analysis proposed in this paper, her treatment of *dou* as a head which needs to incorporate into another head leads to the wrong prediction when Negation is involved. As we mentioned earlier in the paper, *dou* can appear either to the right or to the left of Negation. However, in Chiu's system, when topic-objects are involved, we are dealing with an object pro which moves to Spec of AgrO. As Chiu herself notes, the only heads accessible to *dou* in these cases are V and AgrO. This cannot be correct, as shown in (60).

   (60)   neixie shu,   lisi *dou* meiyou kan-guo
           those   books   Lisi all   not   read-ASP

Sentences such as (60) show clearly that *dou* can be incorporated into Neg°, which is above AgrO. In other words, whenever negation is involved, Chiu will predict that *dou* can appear only to the right of the negation, which is contrary to the facts.

   Lastly, Chiu does not consider the interactions between *wh*-words and *dou*. As we have seen, differences between *wh*-words and non-*wh*-words manifest themselves in the interactions between *wh*-words and *dou*. The manifestations of these differences cannot be straightforwardly accounted for by Chiu's analysis, even if she adopts the same assumptions regarding *wh*-words in Mandarin Chinese.

6. CONCLUSION

In this paper, I have offered an analysis of *dou* 'all' as an adverbial. This analysis shows that the distributional properties of *dou* and its locality restrictions can be accounted for by the adverbial nature of *dou* as well as its quantificational nature. In particular, I have taken into consideration the interactions of *dou* with typical (plural) NPs as well as *wh*-words. Through examining the different types of NPs that *dou* can be associated with, we see that *dou* indeed has a dual status: with typical (plural) NPs, *dou* is a quantifier which has a particular quantificational requirement; with *wh*-words (which are polarity items), *dou* is both a trigger and a binder, providing quantificational force to the *wh*-words. The different locality properties associated with *dou* simply reflect the dual status of *dou* (as a quantifier and as a binder).

   Finally, I would like to bring up the question of language variations. I have also argued here against a floating quantifier analysis of *dou*. If a

floating quantifier analysis of *tous* 'all' in French and *all* in English is the correct analysis, then it is fair to ask why Mandarin Chinese differs from French and English. Bonneau and Zushi (1993) propose that agreement is closely connected to the availability of floating quantifiers. Lack of agreement entails the unavailability of floating quantifiers.[31] As we all know, Chinese lacks overt agreement, and thus it is predicted to be a language without floating quantifiers. The proposal here thus coincides with the analysis proposed in Bonneau and Zushi (1993).

NOTES

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[1] Plural interpretation in (2) applies to countable NPs. *Dou* can also be used to quantify over mass NPs. If *dou* is used to quantify over singular countable NPs such as *a book*, it can only mean all pages of a book:

(i)   ta   ba nei-ben shu   dou kan-wan-le
       he BA that-CL book all   read-finish-ASP

       'He finished reading the whole book.

[2] Various authors have discussed various properties of *dou*. See Chao (1968), Li and Thompson (1981) among others.

[3] It should be noted that there are two types of examples which appear to contradict this property:

(i)   dou shei lai   le
       all   who   come ASP

       'Who is it that came all these times?'

(ii)   ta   dou mai-le   shenme
       he all   buy-ASP what

       'What are the things that he bought?'

See Li (1994) for a discussion of these types of sentences. The analysis offered in Li (1994) is compatible with the analysis given in the paper.

[4] Manner adverbs cannot appear before *dou*, as shown in (i) (though Chiu (1990) has a different judgment). One may think that this indicates that manner adverbs somehow block the quantification of *dou*. However, based on the co-occurrences of adverbs, it appears that there are some ordering restrictions among adverbs, which do not follow any apparent rules (see Li and Thompson 1981). Hence, I will assume here that for some unknown reason *dou* cannot appear after manner adverbs.

(i)   tamen √ zixide   * kan-wan   na-ben shu
       they   carefully all read-finish that CL book

       'All of them read that book carefully.'

[5] The relationship between *dou* and a *bei*-phrase indicated here may be a bit controver-

sial The blocking effect has not been noted earlier Chiu (1990, 1993) claims that *bei*-phrases do not induce a blocking effect, though in Chiu (1993)'s footnote 13, p 217, she notes that *bei*-phrases do serve as a blocker for some speakers I have checked with numerous informants An overwhelming majority of native speakers do sense a blocking effect with a *bei*-phrase A reviewer also agrees with the judgment indicated in this paper

[6] A reviewer notes that there is also a contrast in simple sentences (such as (i) and (ii)) involving an aboutness topic

(i)   neixie xuesheng, hufei zui   yonggong
        those student   Hufei most hard-working

        'Among those students, Hufei is the most hard-working one '

(ii)   *neixie xuesheng, hufei *dou* zui   yonggong
        those   student   Hufei all   very hard-working

According to the reviewer, (ii) is bad because the meaning of the sentence will be 'for each of those students, Hufei is most hard-working', and this is semantically ill-formed In other words, the ungrammaticality of (ii) is a result of the successful quantification by *dou* in such cases However, it is not clear that (ii) actually has such an interpretation The analysis proposed in this paper actually rules out such a sentence since any aboutness topic will not be accessible to *dou*, and thus the quantificational requirement of *dou* will not be satisfied

[7] The reviewer has also included the following example, which I consider to be ungrammatical

(i)   neixie xuesheng, zhangsan *dou* renwei pinde   bu   cuo
        those student   Zhangsan all   think character not bad

        'Those students, Zhangsan thinks that the character of each of them is not bad '

To me, as well as native speakers that I consulted with, this example has the same status as (9b)

[8] It has been noted that (16) actually has a third reading (see Lee (1986) among others), namely 'all of us have all of these books' In such a reading, *dou* quantifies two elements at the same time However, this reading is hardly distinguishable from either the (a) reading or the (b) reading Thus, I do not think that such reading is actually available

[9] See also Liu (1991), which treats *dou* as an unselective binder

[10] Another type of long-distance case involves the relationship between *meige* NP and *dou*, which will not be discussed in this paper It has been noted in the literature that NPs such as *meige X* 'every X' need to appear with *dou* (Liu (1991) among others), as indicated in the contrast in (i)

(i)   a meige ren   *dou* zou-le
           every person all   leave-ASP

           'Everyone has left '

        b *meige ren   zou le
           every person   leave-ASP

           'Everyone has left '

Similar to the examples we see involving *wh*-words, *dou* can 'license' *meige*-NP in a long-distance manner (ii) shows that *meige*-NP can appear inside a relative clause

(ii)   [meige xuesheng xie   de wenzhang] wo *dou* xihuan
        every student   write DE paper   I all   like

        'I like every paper that every student wrote '

As the translation indicates, *dou* not only quantifies over the head NP *wenzhang* 'paper' but also over the NP in the relative clause *meige xuesheng* 'every student' Since *meige*-NP must be licensed by *dou*, we have in (ii) another long-distance case Note that (ii) does not mean 'I like papers that are written by every student' Instead, it means 'for every student, I like every paper that he/she writes'

[11] Lee (1986) actually uses c-command but its definition is equivalent to the m-command definition given in Chomsky (1986)

> (i)   α m-commands β iff neither dominates the other and the first maximal pro-
>   jection dominating α also dominates β

[12] Li and Thompson (1981) use the terms topic and subject interchangeably For them, the subject of the sentence is by default the topic of the subject if there is no other topic in the sentence Hence they actually define the movable adverbs as the ones that can appear at the beginning of the sentence or after the topic or the subject of the sentence For clarity, I slightly modify their definition

[13] Li and Thompson note that the movable time adverbs contrast with another class of time adverbs, which are associated only with the verb rather than with the entire sentence and belong to the nonmovable class The latter class includes adverbs such as *yijing* 'already' and *changchang* 'frequently'

[14] *Dou* and *ye* are different when it comes to negation To recapitulate, *dou* can appear before or after negation, though there is a scope difference However, *ye* can appear only before negation

> (i)   zhangsan *ye*   meiyou   kan-guo   neiben   shu
>   Zhangsan also   not-have read-ASP that-CL book
>
>   'Zhangsan also didn't read that book '
>
> (ii)   *zhangsan meiyou   *ye*   kan-guo   neiben   shu
>   Zhangsan   not-have also   read-ASP that-CL book

The comparison between *ye* 'also' and *dou* 'all' here is mainly to illustrate their distribution It does not imply that they function similarly

[15] Travis (p c) notes that it is possible that some adverbs are fully projected These adverbs then differ from the ones that are not fully projected Hence, the XP-adverbs are expected to adjoined to XPs while the defective ones are expected to adjoined to either X° or X′

[16] See Dougherty (1972) and Carden (1976) for a discussion on these matters

[17] In a simple sentence such as (40a), one cannot rule out actual movement since there is almost no way of distinguishing a left-dislocated analysis from a topicalization analysis in a simple sentence given that the resumptive is an empty pronominal Hence we can assume that for sentences such as (40a), there are two possible representations

> (i)   [zhexie xuesheng, [wo dou xihuan t,]]
>
> (ii)   [zhexie xuesheng, [wo dou xihuan pro,]]

[18] See Demirdache (1991) for details Essentially, resumptive pronouns indicate an in-situ strategy That is, instead of movement at S-structure, there is movement at LF, similar to *wh*-in-situ

[19] Demirdache (1991) indicates that in Hebrew resumptive pronouns in relative clauses first adjoin to IP, then move to C° The second step is a structure-preserving step having to do with the requirement that C° cannot be empty in Hebrew However, it is unclear where resumptives move to in simple left-dislocation structures in her analysis Also, it is conceivable that there are variations due to the complementizer system in a language

[20] The verbal status of *ba* may be problematic since it never receives aspectual markings It has been treated in Huang (1982) and Li (1990) as a Case-marker It is possible that *ba*

is an overt realization of the object Case feature in Agr° since Chinese normally has the object to the right of the verb, and accusative Case is not marked. If this is the case, then *ba* is in Agr⁰. This then might explain why it does not get aspectual markings. Another possibility is to follow Sybesma (1992) among others and treat *ba* as a causative verb. Causative verbs such as *rang* 'to let' do not get aspectual markings.

[21]   Based on the structure given, the term *ba*-phrase or *ba*-NP is actually not appropriate. However, I will continue to use it for the ease of exposition.

[22]   It is certainly possible for *dou* to quantify over frequency adverbs, such as *changchang* 'frequently' in (i). I use NPs in the text just for simplification.

    (i)   ta   changchang *dou* bu   gaoxing
               he   frequently   all   not   happy
               'He is frequently unhappy.'

[23]   (45) is a simplified structure from Tsai (1993). There is an empty operator in the lower Spec of VP. See Tsai (1993) for details.

[24]   For S-structure polarity licensing, see Ladusaw (1979) and Laka (1990) among others. See Uribe-Etxebarria (1994) for LF polarity licensing.

[25]   When c-command is achieved, the polarity licensing requirement is also satisfied. Thus, the apparent adjacency effect associated with *wh*-word is voided.

[26]   One reviewer points out that there are apparent counterexamples such as (i) and (ii) to the claim that *wh*-words must be adjacent to *dou* (aside from the cases that we have just discussed):

    (i)   nage   xuesheng [cong ta   nar]   *dou* keyi xuedao dongxi
               which   student   from him   there all   can   learn   things
               'Anyone can learn something from him.'

    (ii)   shenme xuesheng daoshihou *dou* yao   zhao   wo qianzi
               what   student   at the time all   need   look-for me sign
               'At that time any student will need to look for me to get my signature.'

On the surface, sentences such as (i) and (ii) are contrary to what we have seen in (50a, c). However, if we look more closely, we see that (i) and (ii) are indeed different from (50a, c). The *wh*-words in (i) and (ii) are not polarity items like the ones in (50a, c). Even though they all have universal readings, (i) and (ii) involve free choice readings (comparing with the English translations in these two sentences). More importantly, as Ladusaw (1979) points out, even though free choice *any* in English does not seem to be triggered, they usually appear in sentences with modals. I follow Cheng (1991) and assume that in such cases there is a modality operator which appears to trigger free choice *any*. In the Chinese cases in (i) and (ii), we see overt modals also, and according to speakers I consulted with, the sentences sound much worse without the modals. These sentences simply tell us that *wh*-words in Chinese can also be free choice (see Cheng (1991) for an analysis of *any* in English both as a free choice and a polarity item).

[27]   Given what we have said about the requirement of *dou*, one may wonder whether *dou* will indeed have a variable to bind, assuming that the yes-no question provides the restriction. This is not a problem if we consider the sentential subject as a quantificational phrase after *dou* is adjoined to it.

[28]   A reviewer notes that both readings in (56) are possible. However, after checking with more native speakers, I conclude that the (a) reading is still impossible. This may be linked to whether or not sentences such as (i) have two readings in the first place:

    (i)   lisi   zhexie   xuesheng hen   xihuan
               Lisi   these   student   very   like
               a. 'Lisi, these students like him very much.'
               b.* 'Lisi likes these students very much.'

In general, speakers do not accept (b). See also Lu (1994).
[29] In her discussion of incorporation sites, Chiu does not mention why T° is not a possible site for *dou*. For the impossibility of adjoining to Nom° and Suo°, see Chiu (1993).
[30] One may argue that even if DouP does not move, *dou* can still incorporate into any higher head. However, this will also violate the Economy of Derivation. The requirement of *dou* is simply that it needs to be incorporated into a verbal/inflectional head. The incorporation to the closest inflectional head will suffice, and no further movement will be allowed.
[31] This is simplified version of their proposal. They examine different types floating quantifiers and distinguish them with Quantifiers-Left-Behind. Floating quantifiers are allowed in languages with verbal agreement while Quantifiers-Left-Behind are available only in languages with nominal agreement.

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