The Semantics and Pragmatics of *Lian…dou/ye*, *Lian*, *Dou,* and *Ye*

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Lian…dou is taken as a construction in much of the research literature. However, the possibility still remains whether we can derive the meaning of a *lian…dou* sentence compositionally from *lian*, *dou*, and what is asserted. This paper explores this possibility and formalizes the semantics and pragmatics of *lian*, *dou*, and *ye* in Context Change Semantics. It is shown that the compositional treatment of *lian…dou/ye* can not only account for all their implications but also explain the shades of meaning difference between these two synonymous constructions.

0. Introduction

      Lian…dou sentences have been a hot topic over the last few decades. Traditional studies have concerned themselves with the part of speech of *lian* and *dou*, the structural description of *lian…dou* sentences and the pre-theoretical enunciation of their meaning (Song 1981, Zhu 1982, Wang 1983, Cui 1984, Wang 1988a, 1988b, Zhou 1990). Cui (1993) provides a pragmatic analysis of the presuppositions, conversational implicatures, and inferences of a *lian…dou* sentence. Fang and Fan (2002) provides a lattice-theoretical treatment of its semantics. Portner (2002) grants *lian…dou* the face value of "even…all" and Shyu (1995, 2004) renders it as "including…all" and takes it as a focus marker. Chen (2005) makes a contrastive study of *lian…dou* and *lian…ye*, which are near-synonyms, and finds that they are actually asymmetric if we scrutinize their presuppositions.

      What is common to the above mentioned researches is that *lian…dou* is treated as a construction. This "wholesale" treatment of *lian* and *dou* reveals many interesting facts about Mandarin, but the possibility still remains whether we can describe and account for these facts through separate semantic treatment of *lian* and *dou*. In other words it needs to be figured out whether we can give a compositional semantic treatment to the so-called *lian…dou* construction. This study is mainly motivated by the theoretical attraction to explore this possibility.

      Jiang (1998) and Pan (2006) are among the first endeavors to formalize the meaning of *dou*. They argue that *dou* in Mandarin has only one sense, namely a universal quantifier. Though appealing with formal rigor, this semantics of *dou*, we believe, is too strong to be held.

We will take the first step in our argumentation against taking *lian...dou* as a construction in the remaining of this introductory section. In Section 2 we detail the implications of a *lian...dou* sentence which prepares the ground for the separate treatment of the semantics and pragmatics of *lian* and *dou* in Section 3. In Section 4 we try to reinforce our stance through a discussion of *lian...ye*, the near synonym of *lian...dou*, especially the subtle difference between these two, based on a semantic study of *ye*. In Section 5 we try to formalize *lian*, *dou*, and *ye*. Section 6 concludes the paper.

In this paper, we take the definition of constructions by Fillmore, Kay & O'Connor (1988:501) and argue that *lian...dou* is not a construction. These writers list four criteria for a construction and the fourth one is:

> "…constructions may be idiomatic in the sense that a large construction may specify a semantics (and/or pragmatics) that is distinct from what might be calculated from the associated semantics of the set of smaller constructions that could be used to build the same morphosyntactic object."

Shyu (2004) puts forward two arguments to justify the status of *lian...dou* as a construction: 1) "there is the adjacency requirement of *lian* with the focused element"; 2) "*lian* and *dou* together contribute to *even* reading". We believe the first argument cannot be maintained if we take the following data into consideration:

(1) a. Ta lian gen ziji de [nüer]$_F$ dou bu jianghua.
   He LIAN with self de daughter DOU not speak
   'He even didn't speak with his daughter.'

   b. Ta lian gen [ziji]$_F$ de nüer dou bu jianghua.
   He LIAN with self de daughter DOU not speak
   'He even didn't speak with his daughter.'

   c. Ta lian gen [ziji de nüer]$_F$ dou bu jianghua.
   He LIAN with self de daughter DOU not speak
   'He even didn't speak with his daughter.'

In none of these sentences is *lian* adjacent to the narrow focus. If we extract the focused NP and put it between *lian* and *dou*, ungrammatical sentences result:

(2) *Ta gen ziji de lian [nüer]$_F$ dou bu jianghua.
   He with self de LIAN daughter DOU not speak
   'He even didn't speak with his daughter.'

The reason is that *lian* and *dou* still preserve their membership in the respective classes of prepositions and adverbs and a preposition cannot intervene between a *de*-phrase and the

head noun it modifies. A possible remedy is to say that the narrow foci in the above sentences can be projected to the whole phrases between *lian* and *dou* if we apply the principles of focus projection as explicated in Selkirk (1984). However, the focus can be what is asserted by the whole sentence rather than some element between *lian* and *dou*:

(3) (Heliu jiedong le, xiao shu faya le,) lian taohua dou kai le.
 (River thaw Perf, small tree sprout Perf,) LIAN peachblossom DOU open Perf.
'(Rivers have thawed, small trees sprouted,) and even peach trees have blossomed.'

Here the focus is the assertion "Peach trees blossom." This fact also argues against taking *lian...dou* as a focus maker since whether acting separately or concertedly, neither of the two words can position the locus of the focus without the assistance of phonology.
 If by the second argument the writer means that the *even* reading results from fusing the meanings of *lian* and *dou* together rather than through a compositional process, it can not be maintained as well. For one thing, it is widely acknowledged that *lian* can be omitted without impairing the *even* reading (as the reader can test with the sentences so far we have presented). For another, there are *dou* sentences with the *even* reading in which there seems to be no place to restore *lian*; in other words, we cannot take these sentences as cases of omitting *lian*:

(4) Ta ba wo-de shengri dou wang le.
 He ba my birthday DOU forget Perf.
 'He even forgot my birthday.'

(5) Xiao Wang bi Xiao Li dou gao.
 Xiao Wang compared-with Xiao Li DOU tall
 'Xiao Wang is even taller than Xiao Li.'

(6) Zhangsan gei Lisi dou mei le yi-jian liwu.
 Zhangsan to Lisi DOU buy Perf one-Cl. present
 'Zhangsan even bought Lisi a present.'

What is common to these sentences is that there is a preposition before *dou*: *ba*, *bi*, and *gei* respectively. They show, first, that syntactically *lian* performs its regular duty as a preposition in *lian...dou* sentences and second, that semantically *dou* can convey the meaning of *even* all by itself. In other words we can arrive at the *even* reading by calculating the semantics of *lian* and *dou*, which is the task we are now turning to.

1. *Lian…dou* sentences and their implications

Let's look at the following *lian…dou* sentence and its implications:

(7) (Context: Zhangsan is trying to solve three mathematical problems. The fist and second ones are fairly easy while the third one is really challenging.)
Zhangsan lian [di san ti]$_F$ dou jie chulai le
Zhangsan LIAN the third problem DOU solve out Perf.
'Zhangsan even solved the third problem.'

   a. Zhangsan solved the third question.
   b. It is against the speaker's expectation that Zhangsan solved the third question.
   c. Zhangsan solved some question(s) other than the third one: it can be the first one, the second one or both.
   d. It is the least possible for Zhangsan to solve the third question.

Implication (7a) is what is asserted by the speaker. (7b) is a conventional implicature in the sense of Stalnaker and Peters (1979). On the one hand, it has nothing to do with the truth conditions of the sentence: (7) and (7a) simply have the same truth conditions. On the other, it cannot be canceled under any context. It is contradictory for one to say:

   (8) *Zhangsan lian di san ti dou jie chulai le, zhe shi yiliao zhizhong de shiqing.
       Zhangsan LIAN the third problem DOU solve out Perf., this is expectation in de thing
       *'Zhangsan even solved the third problem, and this is what is expected.'

Implication (7c) is a conversational implicature since it is cancellable, the defining feature of conversational implicatures:

   (9) (mei xiang dao) Zhangsan lian [di san ti]$_F$ dou jie chulai le, jingran mei jie chu diyi he dier ti.
       (Not expect) Zhangsan LIAN the third problem DOU solve out Perf., surprisingly not solve out the first and the second problem.
       '(It is unexpected that) Zhangsan solved even the third problem but did not solve the first and the second problems.'

Implication (7d) is called the end-of-scale reading of *lian…dou* sentences, which means that the assertion is the most informative item on a pragmatic scale. In this case, the concerned scale is the probability of Zhangsan's solving different problems. This is a strong position in the pragmatics of *lian…dou* and *even*. We agree with the analysis of *even* in Kay (1990) and believe that *lian…dou* conventionally only evokes a contrast between two items on the scale with one of them being more informative than the other in

the sense that the former is expected by the speaker to come true while the latter is against her expectation. The end-of-scale reading is just a conversational implicature which can be canceled as shown in (9) and in many cases it simply does not arise or does not matter much in the context. For example:

(10) Lian Zhangsan dou ba di san ti jie chu lai le, ni weishenme jie bu chulai?
LIAN Zhangsan DOU ba the third problem solve out Perf., you why solve not out?
'Even Zhangsan solved the third problem, why are you not able to solve it?'

(11) Lian Zhangsan dou neng jie chu disan ti, Lisi yinggai shenme shiqing dou neng zuocheng.
LIAN Zhangsan DOU able solve out the third problem, Lisi should any thing DOU able accomplish
'Since even Zhangsan was able to solve the third problem, Lisi should be able to accomplish anything.'

In (10) the focus is local. The speaker makes a contrast between the possibility for Zhangsan and for the hearer to solve the third question. It is unnecessary for both the speaker and the hearer to establish a scale of possibility of different people solving the third question so as to felicitously make this utterance or to correctly understand it. This explains why *lian...dou* sentences are often used for the purpose of encouragement. In (11) the focus is global and it is impossible for us to establish a scale of possibility since it will involve all the people concerned in the context and all the deeds they possibly do. Yet this does not preclude the successful use of *lian...dou*, which simply spotlights the contrast between Zhangsan's solving the third question and the possibility for Lisi to achieve any goal. In other words, implication (7d) is just the same as (7c).

We will argue in the following section that these implications of a *lian...dou* sentence is not uncalculable from the semantics and pragmatics of *lian* and *dou*.

2. The semantics and pragmatics of *lian* and *dou*

We will discuss the syntax, semantics, and pragmatics of *lian* and *dou* in this section. We hope it shall become evident that the implications of a *lian...dou* sentence can be calculated from *lian*, *dou*, and what is asserted. Syntactically each behaves the same way when they are used together as when they are used separately.

2.1. The semantics and pragmatics of *lian*

Lian is a preposition in Mandarin:

(12) Lian Zhangsan yigong wu-ge ren.
　　LIAN Zhangsan altogether five-Cl. person
　　'Including Zhangsan, there are altogether five people.'

It is usually translated into "including", yet this is not the whole picture of its semantics: it means more than that. In a normal situation of use, a regular member in a set need not have its membership justified; therefore, through the explicit indication of the membership in a certain group of its object, *lian* implicates that its object is an exceptional member in the group and deserves special attention. For example, Zhangsan in (12), for some reason or other, is kind of an irregular member in the group of people the speaker is counting, so it is brought to the hearer's center of attention to reduce her cost of processing. The point is clearer in the following semantic anomaly:

(13) *Zhe-ge pingguo, Zhangsan lian guorou yiqi chi diao le.
　　This-Cl. apple, Zhangsan LIAN pulp together eat off Perf.
　　*'This apple, Zhangsan ate up including the pulp.'

It is anomalous because we eat an apple for its pulp if we eat one at all. The consumption of pulp is what we take for granted in the event of eating an apple. It is not the same for the skin though, as shown by:

(14) Zhe ge pingguo, Zhangsan lian pi yiqi chi diao le.
　　This-Cl. apple, Zhangsan LIAN skin together eat off Perf.
　　'This apple, Zhangsan ate up including the skin.'

That the implication of exceptionality or unusualness of *lian* is presuppositional in nature is shown clearly by the family of sentences test:

(15) a. Zhe ge pingguo, Zhangsan meiyou lian pi yiqi chi diao.
　　　This-Cl. apple, Zhangsan not LIAN skin together eat off
　　　'This apple, Zhangsan did not eat it up together with the skin.'

　　b. Zhe ge pingguo, Zhangsan ruguo lian pi yiqi chi diao, ta hui weiteng de.
　　　This-Cl. apple, Zhangsan if LIAN skin together eat off, he can stomachache Part.
　　　'If, Zhangsan ate up this apple together with the skin, he will suffer from stomachache.'

    c. Zhangsan ba na-ge pingguo lian pi yiqi chi le ma?
       Zhangsan ba that-Cl. apple LIAN skin together eat Perf. Part.?
       'Did Zhangsan eat that apple together with its skin?'

The proffered[1] content of Zhangsan eating the apple in question together with its skin is negated, conditionalized, and interrogated in (15a)--(15c) respectively. But the implication that the skin is exceptionally involved in the consumption of an apple remains intact. In many cases, the set of entities in which the member denoted by the object of *lian* is exceptional is context-dependent:

    (16) Zhangsan lian zhuozi yikuaier ban zou le
       Zhangsan LIAN table together move away Perf.
       'Zhangsan moved the table away together with other things.'

What Zhangsan moved away besides the table is clear to the interlocutors or self-evident in the context. When uttered out of blue, we can infer from the sentence that the table is a special member in the set of things moved away by Zhangsan.

    Shyu (2004) proposes a restriction on the optionality of *lian*: *lian* can be optional only when the following focus is an indefinite singular NP or a minimizer like *yi dianer* (a little), *ban kou* (half mouthful), *yi yan* (a glance). If the focused constituents are plural or bare NPs, the *even* reading is gone and *dou* merely acts as a distributive marker. We think this restriction is too strict to be maintained:

    (17) Zhangsan (lian) piao dou ti women mai hao le.
       Zhangsan (LIAN) tickets DOU for us buy good Perf.
       'Zhangsan has even bought tickets for us.'

    (18) Zhe-kuai shitou (lian) san-ge xiaohuozi dou ban bu dong.
       This-piece stone (LIAN) three-Cl. young men DOU lift not move
       'This stone, even three young men cannot move it.'

In (17) *piao* is a bare plural NP, referring to the tickets Zhangsan bought for his friends. In (18) *san ge xiaohuozi* is an indefinite plural NP, referring to any three young men.

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[1] The term "proffered" is borrowed from Roberts (1996), which is a generalization of the notion of "being asserted" and intended to cover the core at-issue content not only of indicative sentences but also of interrogative and imperative sentences.

2.2. The semantics and pragmatics of *dou*
2.2.1. Three senses of *dou*

Dou is an adverb in Mandarin. Generally, it has three senses. First, it means that the predication is true of each member in the set denoted by the subject of the sentence. Therefore it is often called distributive marker. *Dou* in this sense must be stressed (or at least must not be phonologically reduced):

(19) Xiao Zhang he Xiao Wang dou shi yanjiusheng.
      Xiao Zhang and Xiao Wang DOU be graduate students
      'Xiao Zhang and Xiao Wang are both graduate students.'

Obviously this *dou* carries the force of universal quantification.
      The second sense is "already", in which *dou* can not carry an emphatic stress:

(20) Ta dou si sui le (hai bu hui shuohua).
      Ta DOU four years Perf. (still not can speak)
      'He is already four years old (but still cannot speak).'

However, this definition of *dou* is too vague to be of much help. Also, *dou* is not an aspect marker in Mandarin as "already" suggests it would be. We will argue in 3.2.2 that this *dou* expresses the speaker's attitude toward the proposition and the sense of "already" is actually marked by the particle *le*. The third sense is "even". To convey this meaning, *dou* often goes together with *lian* though the latter can be omitted in most cases.

2.2.2. A unified account of the three senses of *dou*

Jiang (1998) and Pan (2006) give a unified account of the three senses of *dou* and argue that it is a universal quantifier. For a *lian…dou* sentence and its *even* reading, Pan (2006) argues with the following sentence:

(21) Ta lian [diannao]$_F$ dou mai le
      3rg. LIAN computer DOU buy Perf.
      'He even bought the computer.'

that the focus semantic value of the NP *diannao* ("computer"), which is a contextually constrained set including the computer and other entities, forms the range of quantification for *dou*. He goes on to argue that because the members in the concerned set are ordered in terms of probability and the ordinary semantic value of the NP, namely *diannao* is the lowest extreme in the relation, the *even* reading comes as a natural result. In other words, the *even* reading relies on the alternative set triggered by the focus. This is obviously an extension of the semantics of focus as explicated in Rooth (1985, 1992,

1996). It serves well in the case of *lian...dou* but unfortunately, we should say, it's too strong for the focus phenomenon in general. For example:

(22) A: Zhangsan mai le shenme?
    Zhangsan buy Perf. what?
    'What did Zhangsan buy?'

   B: Zhangsan mai le [diannao]~F~.
    Zhangsan buy Perf. computer
    'Zhangsan bought the computer.'

In a normal situation of use where we assume that the interlocutors abide by the conversational principles and the quantity maxims in particular, B's utterance means that to her knowledge Zhangsan only bought the computer since this is the strongest statement she can make.

Another counterargument against this universal quantification explanation of *dou* in *lian...dou* sentences is that it amounts to Lycan (1991)'s strong position about the semantics and pragmatics of *even*. According to Lycan (1991), *even* in English is a universal quantifier and contributes to the truth-conditional meaning of a sentence. Therefore the following sentence entails that everyone in the context who are more likely to eat chili than Granny have tried it:

(23) Even [Granny]~F~ tried the chili.

As this semantics of *even* can be easily refuted, it is not hard for us to find counterexamples of the unified account of *lian...dou*:

(24) Zhangsan lian diannao dou mai le, juran shebude mai ge shubiao.
    Zhangsan LIAN computer DOU buy Perf., surprisingly unwilling buy Cl. mouse
    'Zhangsan even bought the computer, but was unwilling to spend the money for a mouse.'

As for the second sense of *dou*, namely "already", Jiang proposes that it is a variation of *lian...dou* construction. For example, (25a) can be paraphrased as (25b):

(25) a. Dou [shier dian]~F~ le (Zhangsan hai mei huilai)
    DOU 12 o'clock Perf. (Zhangsan still not come back)
    'It is already 12 o'clock (but Zhangsan still has not come back).'

   b. Lian [shier dian]~F~ dou guo le
    LIAN 12 o'clock DOU pass Perf.
    'It was even past 12 o'clock.'

However, not all sentences of this type can be converted into a *lian...dou* sentence. For example, (26b), the paraphrase of (26a), is ungrammatical:

(26) a. Fan dou [liang]$_F$ le (ni hai bu kuai chi)
　　　　Meal DOU cold Perf. (you still not quick eat)
　　　　'The meal has got cold (why haven't you had it?)'

　　 b. *Fan lian [liang]$_F$ dou liang le
　　　　Meal LIAN cold DOU cold Perf.
　　　　'The meal has got cold.'

2.2.3. The non-truth-conditional meaning of *dou*

　　　　We argue that *dou* in the second and third senses is neither a distributive marker nor an aspect marker of "already"; rather, it expresses the speaker's attitude towards the eventuality described by the sentence in question. It plays no role in determining the truth conditions and simply signifies that the eventuality is against her expectation. To be more exact, it is not the eventuality itself that violates the speaker's expectation but the eventuality in conjunction with another eventuality salient in the context. In (25) for example, it is not the fact that it was midnight itself which is out of the speaker's expectation but Zhangsan's not coming back at midnight occurs unexpectedly.

　　　　In Section 2 we have scrutinized the different implications of a *lian...dou* sentence. As we can see from the following example, sentences with only *dou* can have the same implications:

(27) Zhangsan [dazi]$_F$ dou bu hui.
　　　Zhangsan type DOU not can
　　　'Zhangsan even cannot type.'

　　 a.　Zhangsan cannot do typing.
　　 b.　It is against the speaker's expectation that Zhangsan cannot do typing.
　　 c.　Zhangsan cannot do any other thing that is more sophisticated than typing.

　(27a) is an assertion; (27b) is a conventional implicature; and (27c) is a conversational implicature, which is canceled in:

(28) Zhangsan [dazi]$_F$ dou bu hui, juran hui bian chengxu.
　　　Zhangsan type DOU not can, surprisingly can write programs
　　　'Zhangsan even cannot type, but can write programs.'

We argue that *dou* itself can be held responsible for the meanings of so-called *lian...dou* construction. But the fact that we can insert a *lian* in front of the focus makes our argument dubious. This doubt could be dispersed if we look at the following sentences:

(29) a. Zhangsan dou bu hui [dazi]$_F$.
     Zhangsan DOU not can type
      'Zhangsan even cannot type.'

  b. Zhansan [dazi]$_F$ dou bu hui.
     Zhangsan type DOU not can
     'Zhangsan even cannot type.'

  c. Zhansan lian [dazi]$_F$ dou bu hui.
     Zhangsan LIAN type DOU not can
      'Zhangsan even cannot type.'

(30) a. Zhangsan dou hui jie [disan ti]$_F$.
     Zhangsan DOU can solve the third problem
     'Zhangsan even can solve the third problem.'

  b. Zhangsan [disan ti]$_F$ dou hui jie.
      Zhangsan the third problem DOU can solve
     'Zhangsan even can solve the third problem.'

  c. Zhangsan lian [disan ti]$_F$ dou hui jie.
     Zhangsan LIAN the third problem DOU can solve
      'Zhangsan even can solve the third problem.'

In (29a) and (30a) there is no place for us to restore *lian*. There may be subtle differences in meaning between (29a) and (29b) and between (30a) and (30b) but the point is that no implication in (29c) and (30c) is missing from (29a) and (30a) respectively.

In view of the semantic behavior of *lian* and *dou* as explicated above, it's easy to see that there is overlap between their meanings. Marking an entity as an exceptional member in the discourse range of a predicate entails the potential of violating one's expectation when applying the predicate to the entity. This is why *lian* can often be safely removed from a *lian…dou* sentence without affecting its implications. This is also the key to the contrast as well as the similarity between *lian…dou* and *lian…ye* sentences.

3. The semantics and pragmatics of *ye*, and *lian…ye*

Lian…ye is normally taken as a synonym of *lian…dou* and therefore a construction as well. If we are to stick to the exposition so far we have made about *lian…dou*, we have to explicate how the meaning of *lian…ye* grows out of the separate meanings of *lian* and *ye*. We set out for this task in this section.

A puzzle with *lian…dou* and *lian…ye* is that though they are interchangeable in most cases, they are not in all cases. Chen (2005) records his intuitive judgment about the following sentences:

(31) a. Lian yuehan dou jiao le zuoye le, geng-bie-shuo banshang qita tongxue le.
   LIAN John DOU hand-in Perf. homework Perf., more-NEG-mention
  in-the-class other students Perf.
 'Even John handed in the homework, not to mention other students in the class.'

  b. ?/# Lian yuehan ye jiao le zuoye le, geng-bie-shuo banshang qita tongxue le.
   LIAN John YE hand-in Perf. homework Perf., more-NEG-mention
  in-the-class other students Perf.
 'Even John handed in the homework, not to mention other students in the class.'

We'll try to solve this puzzle in this section as well.

 Ye is similar to *dou* in two aspects: first, both are adverbs; second, both make no contribution to the truth-conditional meaning of a sentence. Now let's look at an example:

(32) Zhangsan lian [disan ti] ye jie chulai le.
Zhangan LIAN the third problem YE solve out Perf.
 'Zhangsan even solved the third problem.'

 a. Zhangsan solved the third question.
 b. It is against the speaker's expectation that Zhangsan solved the third question.
 c. Zhangsan solved some question other than the third one.

(32a) is what is asserted and (32b), a conventional implicature due to *lian*. Different from *lian…dou*, implication (32c) is a conventional implicature instead of a conversational implicature (Cf. (7c, d)). In other words, it cannot be cancelled, which explains the oddity of the following sentence:

(33) ??Zhangsan lian [disan ti] ye jie chulai le, jingran mei jie chu di yi ti he dier ti.
 Zhangan LIAN the third problem YE solve out Perf., surprisingly not solve out the first and the second problem
 *'Zhangsan even solved the third problem, but failed to solve the first and the second problems.'

This is due to the difference in meaning between *dou* and *ye*. *Dou* expresses the speaker's surprise at the eventuality: in this case, she finds it unexpected that Zhangsan solved the third question, the most challenging one. The reason for her surprise may be that to her knowledge Zhangsan is not an intelligent student or that the third question is very challenging or both. It is subjective, so to speak. Yet *ye* is objective. It is the speaker's indirect report about, or secondary assertion of, the existence of another state of affair which is parallel to the asserted state of affair in some aspect.

 The point is made much clearer by the fact that sentences with the focus preceding *ye*, namely those in which we can insert *lian* in front of the focus are

ambiguous while those with the focus following *ye* has only one reading, namely that of secondary assertion.

(34) a. Zhangsan [disan ti]$_F$ ye jie chulai le.

    b. Zhangsan ye jie chulai le [disan ti]$_F$.
      Zhangsan YE solve out Perf. the third problem
      'Zhangsan also solved the third problem.'

    i. Zhangsan solved the third problem.
    ii. Zhangsan solved some problem other than the third one.

As the reader can check themselves, (34a) has two readings: one is the same as (33) and the other, the same as (34b) which primarily asserts that Zhangsan solved the third problem and secondarily asserts that he solved some other problem(s) as well.

The semantic component of (32b)-kind implication in a *lian...ye* sentence is attributable to *lian* which conventionally implicates that its argument is an exceptional member in a contextually relevant set. Thus we get all the implications of a *lian...ye* sentence through calculating the meaning of *lian* and *ye*.

Now let's look at (31). Both have the implication that the other students in the class have handed in the homework. The reason for the difference in meaning between *lian...dou* and *lian...ye* as reflected in their respective extension is that the implication of the other students in the class having handed in their homework is a conversational implicature in the former and a conventional implicature, or a secondary assertion in the latter. We can reinforce a sentence by explicitly asserting its conversational implicature due to its cancelability, but the same technique is not applicable to an implication which has been asserted, no matter whether it has been done primarily or secondarily.

4. Formalization of the semantics and pragmatics of *lian*, *dou*, and *ye*

In this section, we try to pin down the meaning of *lian*, *dou*, and *ye* in context change semantics. Context change semantics takes the context as a set of possible worlds. To be more exact, it is the intersection of all propositions that form the context set in the sense of Stalnaker (1978). The meaning of a sentence, a set of possible worlds in which the proposition it denotes is true, is represented as a context change potential, which updates the context by ruling out the possible worlds in which the sentence is false. Let's look at the meaning of *dou* first:

(35) Zhangsan [disan ti]$_F$ dou jie chulai le
    Zhangsan the third problem DOU solve out Perf.
    'Zhangsan even solved the third problem.'

a. Zhangsan solved the third problem.
b. Zhangsan didn't solve the third problem.

As we have argues in 3.2, *dou* basically has two senses and its is used in (35) in the sense of expectation violation. If something violates the speaker's expectation, it is because she predicted that the course of event should have taken the opposite direction in view of what she has known up to the moment when she makes the utterance. In other words, Zhangsan's NOT solving the third problem is more predictable than his solving it, which means (35b) is less informative than (35a), because technically, the more predictable a sentence is the bigger the cardinality of the intersection of the context and the set of possible worlds it expresses. That is, it rules out less possible worlds than the unpredictable one. Let c be the context when (35) is uttered and p the proposition it expresses. We can define *dou* as:

$$(36) \, |c + \neg p| > |c + p|$$

It might have been noticed that it follows from this proposal that *dou* is insensitive to focus. What is at issue is the contrast between the expectation-violating sentence and its negation, namely the expectation-satisfying one. The negation here operates over the whole sentence rather than part of it. This is welcomed since as we have explicated in Section 3, *dou* does not operate as a universal quantifier which takes the focus semantic value as its range.

Now let's look at the meaning of *lian*. Syntactically it is a preposition, but semantically it is an operator which is sensitive to the focus. By sensitive we mean its interpretation depends on the focal structure of the sentence. Here we adopt the focal structure representation in Rooth (1996) and represent the meaning of (37a) as (37b) (Q1, Q2, Q3 are the shorthand expressions of the first question, the second question, and the third question):

(37) a. Zhangsan lian [disan ti]$_F$ dou jie chulai le
       Zhangsan LIAN the third problem DOU solve out Perf.
       'Zhangsan even solved the third problem.'

   b. dou(lian([$_S$[$_{NP}$disan ti]$_{F(\{Q1, Q2, Q3\}, C)}$[λe_2[Zhangsan jie chu le e_2]]]))

{Q1, Q2, Q3} denotes the focus semantic value of the NP in focus. *Lian* implicates that what a focus constituent denotes is an exceptional member in its focus semantic value. Technically this means *lian* partitions the set into a singleton set which has the ordinary semantic value as its only member and a set which includes the rest of members. We could have said that *lian* poses a relation of probability scale on this set but we believe it is not of much linguistic significance. In most cases, what is at issue is not the accurate

ordering of alternative probabilities but that the actual course of event described by the ordinary semantic value is exceptional in a relevant sense. For (37a) which member in {Q1, Q2} is more difficult than the other has no bearing on its felicitous utterance. Generally, an exceptional state of affair is less predictable than a "normal" one. Let q be any member in the focus semantic value of a sentence except its ordinary semantic value and let p be the ordinary semantic value of the sentence. We can define *lian* as:

(38) $|c+q| > |c+p|$

It should be obvious that to say something is unpredictable is almost the same as saying what it negates is predictable, so we can represent the similarity between the meaning of *lian* and that of *dou* as:

(39) $|c+\neg p| \approx |c+q|$

(37b) illustrates how we get the meaning of *lian...dou* compositionally. The following shows the semantic role *lian* plays in a sentence without *dou*:

(40) Lian($[_S[_{NP}guopi]_{F(\{skin, pulp\}, C)}[\lambda e_2[zhege \ pingguo, \ Zhangsan \ chidiao \ le \ e_2]]]$)

Let q stand for "Zhangsan eats the pulp of the apple" and p, "Zhangsan eats the apple including its skin", $|c+q| > |c+p|$.

Now let's look at the meaning of *ye*:

(41) Zhangsan ye jie chu le [disan ti]$_F$.
  Zhangsan YE solve out Perf. the third problem
  'Zhangsan also solved the third problem.'

Different from *dou*, *ye* is objective in the sense that its conventional implicature has nothing to do with the speaker's attitude but is related to the actual state of affair. For a speaker to legitimately utter (41), the context must entail that Zhangsan solved other problems. *Ye* establishes the parallelism between the actual statement and the entailed proposition by signaling that the two are equally informative since they are equally predictable as judged by the speaker. Let c be the context when (41) is uttered and q, any proposition in the focus semantic value except the ordinary semantic value of the sentence and p, the ordinary semantic value of the sentence. The meaning of *ye* is:

(42) $|c+q| = |c+p|$

As for the relative scope of *lian* and *ye*, we suggest that *lian* has a wider scope than *ye* in accordance with the monotonic principle of compositionality put in Cann

(1993:4): "the meaning of an expression is a monotonic function of the meaning of its parts and the way they are put together". It predicts that a syntactic/semantic operation can only add but not reduce the meaning of the expression on which it operates. For a *lian…ye* sentence, after the operation of *ye* on the proposition "Zhangsan solved the third question", we know that it is equally informative with a parallel proposition which is entailed by the context. In other words, they may rule out the same number of possible worlds from the context. After applying the meaning of *lian* to the *ye* sentence, the semantic load of the sentence increases since the resultant proposition turns out to be able to rule out more possible worlds than the parallel proposition.

5. Conclusion

In this paper, we mainly explore the theoretical possibility of deriving the meanings of a *lian…dou* sentence compositionally from the meanings of *lian*, *dou*, and what is asserted. This treatment obviously has an advantage over taking it as a construction from the acquisition point of view. The syntactic and semantic behavior of *lian* and *dou* seem to favor this compositional treatment. We have also studied the semantics of *ye* and *lian…ye*, a near-synonym of *lian…dou*, and discerned the shades of meaning difference between these two. It lends further support to our arguments. The semantics and pragmatics of *lian*, *dou*, and *ye* are formalized in context change semantics.

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