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Negation under *Yiqian* 'Before' in Mandarin Chinese and Cross-linguistic Variation in Expletive Negation*

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This article deals with the question of why negation under *yiqian* 'before' in Mandarin Chinese does not alter the truth conditions of the sentence. I propose that the complement clause of *yiqian* must denote a situation that exhibits a potential change of state from the prior nonexistent state to the resultant post-state. The semantic interpretation of *yiqian* is sensitive to this change of state and may select either the initial or final point of the complement eventuality as a reference time, depending upon whether the complement clause denotes the prior-state or the post-state. The addition of *mei* under *yiqian* does not change the meaning of the sentence because before the latest time of the prior-state is truth-conditionally indistinguishable from before the earliest time of the post-state. In addition to Mandarin Chinese, this article discusses cross-linguistic variation of expletive negation in some typologically different languages, showing that the wide or narrow distribution of expletive negation may be due to the [±interpretable] feature that a negation marker carries in a given language.

Key words: expletive negation, redundant negation, *yihou* 'after', *yiqian* 'before'

1. Introduction

This article deals with a curious phenomenon related to negation under *yiqian*/*zhiqian* 'before' in Mandarin Chinese. A construction with the form '*P yiqian*/*zhiqian*, *Q*' is usually understood as the event denoted by *Q* having occurred before the event denoted by *P*. For example, sentence (1) can be used in the context given below:

(1)   Context of utterance: Zhangsan has been a considerate boy since he was around age 10. Since then he has often helped his parents clean the house, wash the dishes, etc. Now he is studying in a college.
       Zhangsan   shang   daxue   yiqian,   ta   jiu   yijing   hen   dongshi   le.
       Zhangsan   attend   university   before   he   then   already   very   sensible   Par

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Chang	bang	bama	zuo	jiashi,		ta	zhen	shi	yi-ge	nande-de	haizi.
often	help	parents	do	housework		he	really	be	one-Cl	admirable	child

'Zhangsan had already been sensible before he went to a college. He often did housework for his parents. He is really an admirable child.'

Very interestingly, when the *yiqian*-clause in (1) is negated as in (2), the meaning of the sentence does not seem to be altered; (2) can be used to describe the same situation as in the context given in (1).

(2)

Zhangsan	**mei**	shang	daxue	yiqian,	ta	jiu	yijing	hen	dongshi	le.
Zhangsan	**not**	attend	university	before	he	then	already	very	sensible	Par

'Zhangsan had already been sensible before he went to a college.'

Semantically vacuous negation has not received much attention by Chinese linguists, though such examples are very common, as already observed by scholars such as Lü (1974:379), Lien (1979), Wiedenhof (1994), Wang (2004), Huang (2005), Xu (2008), and Xiao & McEnery (2008).[1] Xiao & McEnery (2008) call such negation 'redundant negation'. Among these scholars, Wang (2004) described the temporal distinction between 'VP-*zhiqian*' and 'not VP-*zhiqian*' in great detail. Lien (1979) provided the first explanation of this phenomenon, arguing that 'redundant negation' is a reflection of logical structure.[2] He illustrated semantically vacuous negation with the following pair of examples.

(3) a.

Yisheng	lai	yiqian,	Zhangsan	jiu	si	le.
doctor	come	before	Zhangsan	then	die	Asp

'Before the doctor came, Zhangsan died.'

b.

Yisheng	hai	mei	lai	yiqian,	Zhangsan	jiu	si	le.
doctor	yet	not	come	before	Zhangsan	then	die	Asp

'Before the doctor came, Zhangsan died.'

Interestingly, semantically vacuous or redundant negation can be found in many other typologically unrelated languages. In a paper discussing negation in Catalan, Espinal (1992) argued that a syntactic negation may make no effective contribution to the interpretation of the sentence containing it. She used the term 'expletive negation' to refer to such a negation constituent. Below is one example from Espinal's (1992) article which illustrates the pleonastic nature of negation in a *before*-clause in Catalan.

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[1] For the syntactic status of *yiqian* 'before' and *yihou* 'after', Liu & Oakden (2014) have recently argued that 'they are nominal bound forms at the phrasal level'. This article will not discuss this syntactic issue. For other references related to the syntactic issue, see the references cited by them.

[2] I thank Professor Chinfa Lien for bringing his article to my attention.

(4) Haurem   d'intervenir abans   que (no) arribi el   nou   gerent.
     Have+FUT   to.take.part before   that not arrive the   new   manager
     'We'll have to take part in the discussion before the new manager arrives.'

According to her, a lexical negative in certain syntactic environments is interpreted expletively because it is 'absorbed' or 'cancelled' by some specific lexical item entailing negation that selects and governs it at the level of Logical Form. This syntactic approach to negation under *before* holds the view that negation is not interpreted at the conceptual representation.

    Similarly, Prete (2008) reported the occurrence of expletive negation in Italian under certain contexts. According to him, *prima* 'before', as opposed to *dopo* 'after', may license expletive negation as is shown below.

(5) Lo   fermerai   prima   che   non   faccia   qualche   sciocchezza.
     Him(cl)   stop(2sg fut) before   that not   do(3sg subj)   some   folly
     'You will stop him before he does anything silly.'

However, it is not always possible to freely add the negation marker *non* to a *prima*-clause without creating a semantic effect. In Italian, expletive negation is allowed only in '*prima*-clauses which are assumed to be false in the world of the context' (Prete 2008:162). Hence, in contrast to (5), (6) is unacceptable when uttered in a context in which the future event of Leo's leaving for Rome is taken for granted.

(6) Saluterai   Leo   prima   che   (?non) parta   per   Roma.
     Greet(2sg fut) Leo   before   that not   leave(3sg subj) for   Rome
     'You will see Leo off before he leaves for Rome.'

    In contrast to Italian, the factual/non-factual interpretations of *yiqian*-clauses do not have an effect on the use of expletive negation in Mandarin Chinese. Example (2) is a case of a factual *yiqian*-clause, as the context in (1) shows; (3a) and (3b) can be construed as either a factual or a non-committal clause. A non-factual/counterfactual *yiqian*-clause can be illustrated by (7):

(7) Zhadan   (mei)   baozha   yiqian,   jiu   bei   chaichu   le.
     bombs   not   explode   before   then   Pass   remove   Asp
     'Bombs were removed before they exploded.'

We can thus conclude that semantically vacuous negation under *yiqian* is not sensitive to the factual/non-factual interpretation of the *yiqian*-clause.[3]

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[3] An anonymous reviewer wonders if expletive negation might occur in a wider context than what is presented in this article. He/she pointed out that *before* is a presupposition trigger and a presupposition may survive many tests such as the negation test, the modal test and the question test, etc. According to him/her, both (ia) and (ib) presuppose that John had his dinner.

    (i)   a. Before John had his dinner, Mary left.
          b. Before John did not have his dinner, Mary left.

German also has a very similar, though not identical, phenomenon. Krifka (2010a) pointed out that the following German sentence contains a negative marker under the temporal *before*-clause and the sentence appears to have the same truth conditions with or without the negation.

(8)   Peter wollte Potsdam **nicht** verlassen bevor (**nicht**) das Projekt in ruhigem Fahrwasser war.
        'Peter did not want to leave Potsdam before the project was running smoothly.'

Significantly, Krifka (2010a) observed that expletive negation under *bevor* in German must be accompanied by negation in the main clause. Without the main clause negation, it is not clear how the negation of the embedded clause should be interpreted at all, as shown by (9):

(9)   Peter wollte Potsdam verlassen, bevor (#**nicht**) das Projekt in ruhigem Fahrwasser war.

Thus, the German data is slightly different from the Mandarin Chinese, Catalan, or Italian examples, which do not require main clause negation. Krifka (2010a) proposed a novel semantic account for 'expletive negation' under *bevor* in German. Under his analysis, negation in the *bevor* clause turns out to be interpreted.

The cross-linguistic variation in expletive negation raises very interesting questions concerning why and how a negation marker can be semantically empty and why the distribution of expletive negation is different cross-linguistically. The main focus of this article is negation under *yiqian* in Mandarin Chinese. I shall show that the nature of the seemingly semantically vacuous negation under *yiqian* in Mandarin Chinese is different from expletive negation in Catalan as discussed by Espinal (1992, 2000). The former is brought about by a semantic requirement that *yiqian* imposes on precedence relation, whereas the latter is a syntactic consequence of a negation marker with [–interpretable] feature that needs to look for a feature-checker with [+interpretable] feature. In addition to Mandarin Chinese and Catalan, German and English will also be briefly discussed.

The reviewer then wonders whether examples such as the following are also cases of expletive negation. Both (iia) and (iib) presuppose that Lisi ate something.

(ii)   a.   Zhangsan   zhidao   Lisi   chi-guo   dongxi.
          Zhangsan   know   Lisi   eat-Asp   thing
          'Zhangsan knew Lisi ate something.'
     b.   Zhangsan   bu   zhidao   Lisi   chi-guo   dongxi.
          Zhangsan   not   know   Lis   eat-Asp   thing
          'Zhangsan did not know Lisi ate something.'

My answer is negative. On the one hand, English sentences such as (ib) are actually unacceptable according to Espinal (1992). On the other hand, what is at issue for expletive negation is the interpretation of the negation itself, not any presupposition under its scope. Although both (iia) and (iib) presuppose that Lisi ate something, the negation word *bu* 'not' in (iib) is interpreted as a true negation and cannot be omitted. But in our Mandarin Chinese sentences such as (2), the negation word behaves as if it is not there. So, expletive negation and presuppositions under the scope of negation, modal or question operator are different linguistic phenomena. Finally, *before* actually does not presuppose the truth of its complement clause; see note 8 and the discussion in the Appendix.

This article is organized as follows. Sections 2 and 3 discuss Espinal's (1992, 2000) and Krifka's (2010a) approaches to 'expletive negation', showing that they cannot be extended to the Mandarin Chinese data. Section 4 makes a proposal to account for the data, based on the idea that the semantic interpretation of *yiqian* is sensitive to the change of state from the prior nonexistent state to the resultant post-state. It may select either the initial or final point of a specified interval as a reference time depending upon whether the complement clause denotes the prior-state or the post-state. In section 5, I shall make comments on some previous analyses of negation under *yiqian*, Lien's (1979) work in particular. Section 6 is a comparison between *yiqian* and *yihou* with respect to the licensing of semantically vacuous negation. Section 7 examines the typology of expletive negation and sketches a partial account for the cross-linguistic variation reported in section 1. Section 8 is the conclusion.

2. Espinal's (1992, 2000) approach to expletive negation

According to Espinal (1992, 2000), 'expletive negation' is a natural-language phenomenon induced by specific lexical items with nonveridicality property such as *before*, *until*, inequality comparative operators, a specific high degree operator and some negative and adversative predicates. Negation under the scope of these expressions such as *non* in Italian and *no* in Catalan makes no effective semantic contribution. Two illustrating examples from Espinal (2000:49) are given here, where (10c) is the relevant syntactic configuration.

(10) **Italian**

    a. Resto   *finché*   (*non*)   arriva   qualcuno.
        stay.1sg   until   not   arrives   somebody
        'I'll stay until somebody arrives.'

    Catalan

    b. Val *més*   que   vingueu   *que*   *no*   que   us   quedeu   sols.
        better   that   come.SUBJ.2pl   than   not   that   you$_{\text{CL}}$ remain.2pl   alone
        'It's better you come than that you stay on your own.'

    c. […[$_{\text{XP}}$ X^0 [$_{\text{CP}}$ C^0 [$_{\text{NegP}}$ Neg …]]]]

Espinal (2000) suggests that the negation marker in an expletive negation structure is a polarity item that is licensed under the scope of a nonveridical operator which carries a [+neg] feature. (Non)veridicality is defined as follows:

(11) (Non)veridicality (Zwarts 1995:287)
    Let O be a monadic sentential operator. O is said to be veridical just in case $Op \Rightarrow p$ is logically valid. If O is not veridical, then O is nonveridical. A nonveridical operator O is called adveridical iff $Op \Rightarrow {\sim}p$ is logically valid.

Espinal (2000:55–56) claims that the negation marker in an expletive negation structure must move, at the level of LF, to the position where the nonveridical operator X$_0$ is located due to the requirement of feature checking (Chomsky 1995). Once the movement takes place, negation

absorption, as defined in (12), takes place, eliminating superfluous negative features. Therefore, the negation marker under the scope of a nonveridical operator is not licensed as an independent negative concept.

(12) (Espinal 2000:58)
      α absorbs β, $\alpha = X^0_{FNeg}$ and β = FNeg of a negative item
      iff
      with regard to a configuration such as
      (i) $[_{XP}$ Spec $[_{X'} X^0_{FNeg}]]$
      (ii) β has been Attracted/Moved to either Spec, XP or to X^0.

Espinal's analysis of expletive negation as logical absorption is quite insightful and can apply to a variety of languages such as Catalan, Spanish, and Italian. For example, Prete's (2008) analysis of expletive negation under *prima* 'before' follows this line of thought. According to him, *prima* 'before', as opposed to *dopo* 'after', shows many properties similar to those of comparative constructions and should be analyzed as a temporal comparative containing the meaning of *più* 'more' and *presto* 'early'. The comparative *più* introduces a negation operator.[4] It is this negation operator that absorbs the expletive negation that is within its c-command domain. The absorption process is parallel to that for normal comparatives, which also license expletive negation.

Given the above absorption proposal, one might wonder whether the same absorption approach can be extended to Mandarin Chinese. I would like to argue that the answer is negative.

If one only considered negation under *yiqian*, Espinal's analysis could certainly be extended to Mandarin Chinese under the assumption that *yiqian* has [+neg] feature. But the fact is that, outside of *yiqian*-clauses, we do not find data similar to those reported by Espinal's (1992, 2000) papers. For example, in contrast to the Spanish, Italian, and Catalan sentences in (13), where the negation marker does not affect the truth conditions, in the Mandarin Chinese sentences (14)–(16), the negation marker *bu* or *mei* must be interpreted as a true negation rather than an expletive element, though it is embedded in a nonveridical operator.

(13) a. Preferiría   salir   con   vosotros   que   (no)   estar
          Prefer+COND.1sg go-out   with   you   than not   be
          trabajando   todo   el   fin   de   semana. (Espinal 2000:48)
          working   whole the end   of   week
          'I would rather go out with you than be working the whole weekend.'
      b. Resto   finché   (non)   arriva   qualcuno. (Espinal 2000:49)
          stay.1sg until   not   arrives   somebody
          'I'll stay until somebody arrives.'

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[4] According to Seuren (1973), a comparative such as (i) can be interpreted as (ii), which contains a negation operator.
      (i)   John is taller than Bill.
      (ii) There is a degree d such that John is d-tall and Bill is not d-tall.

    c.   Em   temo   que   no   escullin   nou   director. (Espinal 2000:54)

        meCL   am-afraid that   not   elect+SUBJ.3pl new   director

        'I am afraid that a new director would be elected.'

(14) a.   Yuqi   zheng-ge   zhoumou   gongzuo,

        than   whole-Cl   weekend   work

        buru   women   chu   qu   wan.

        would.rather   we   go   out   play

        'I would rather go out to play with you than be working the whole weekend.'

    b.   ??Yuqi   zheng-ge   zhoumou   bu   gongzuo,

        than   whole-Cl   weekend   not   work

        buru   women   chu   qu   wan.

        woud.rather   we   go   out   play

        'Lit.: I would rather go out to play with you than not working the whole weekend.'

(15) a.   Wo   hui   dai   zai   zheli   zhidao   you   ren   lai.

        I   will   stay   in   here   until   have   person   arrive

        'I shall stay here until somebody arrives.'

    b.   ??Wo hui   dai   zai   zheli   zhidao   you   ren   mei   lai.

        I   will   stay   in   here   until   have   person   not   arrive

        'I shall stay here until somebody does not arrive.'

(16) a.   Wo   pa/huaiyi   Lisi   chidao-le.

        I   afraid/doubt   Lisi   late-Asp

        'I am afraid/doubt that Lisi was late.'

    b.   ??Wo pa/huaiyi   Lisi   mei   chidao.

        I   afraid/doubt   Lisi   not   late

        'I am afraid/doubt that Lisi was not late.'

In (14)–(16), the (a) and (b) sentences do not mean the same thing. The marker *mei* is a true negation marker that is independently interpreted and this is why (14b) and (15b) sound weird. Clearly, the Mandarin Chinese data indicates that 'expletive negation' in Mandarin Chinese is not a general phenomenon, but a special property restricted to *yiqian*-clauses. If the syntactic absorption approach were to apply to negation in Mandarin Chinese, it would be too powerful a mechanism that would require otherwise unnecessary constraints to restrict the application only to negation under *yiqian*.

Second, unlike Italian *prima* 'before', Mandarin Chinese *yiqian*-clauses do not seem to share properties with comparative constructions. In fact, it is even questionable to claim that Mandarin Chinese has clausal comparatives (see Lin 2009 for a more recent view on this point). If Mandarin Chinese only has phrasal comparatives, then it is implausible to analyze *yiqian*-clauses as containing a comparative clause in the way that Prete (2008) analyzes Italian *prima*-clauses. This in turn implies that the absorption account proposed by Prete for Italian expletive negation under *prima* cannot be extended to Mandarin *yiqian*.

Finally, the syntactic absorption approach may wrongly predict unattested interpretations. Compare (17a) with (17b). In this set of examples, the main verb is *fouren*, which is a non-veridical verb as it can license an NPI within its scope, as attested by (17a). Example (17a) implies that Zhangsan ate nothing, whereas (17b) implies that Zhangsan ate something.

(17) a. Zhangsan   fouren   ta   chi-le   renhe   dongxi.
              Zhangsan   deny   he   eat-Perf   any   thing
              'Zhangsan denied that he ate anything.'
      b. Zhangsan   fouren   ta   mei   chi   (renhe)   dongxi.
              Zhangsan   deny   he   not   eat   any   thing
              'Zhangsan denied that he did not eat (any) things.'

Since the absorption analysis stipulates that a non-veridical operator absorbs negation, *mei* in (17b) should be able to be absorbed, making no semantic contribution to the embedded clause. However, *mei* in (17b) must be interpreted, because what Zhangsan denied is the claim that he ate nothing rather than the claim that he ate something. Espinal's syntactic approach to expletive negation would make a wrong prediction in this case.

However, a caveat about our arguments above against a syntactic absorption approach to Chinese redundant negation is in order; that is, it might be the case that the syntactic absorption approach does not require that anything that licenses an NPI must license an expletive negation marker. This counter-argument is reasonable, but it would only make the syntactic absorption approach nothing but a stipulation that applies only to *yiqian* but not to any other non-veridical operators, thereby losing its explanatory force.

3. Krifka's (2010a, 2010b) approach to negation under *bevor*

Krifka's (2010a) approach to negation under *bevor* in German is completely different from Espinal's approach. While the latter is a syntactic approach to a semantic phenomenon, the former is a pure semantic-pragmatic approach. Another crucial difference between the two approaches is that while Espinal holds that expletive negation in languages such as Catalan is not interpreted, Krifka maintains that expletive negation in German is interpreted.

As I show in the Appendix, Krifka's semantic account is specifically tailored for the German data, which crucially requires the presence of matrix negation to license expletive negation under *bevor*. However, redundant negation in Mandarin Chinese does not require matrix negation, and for this reason alone one can conclude that Krifka's account for the German data cannot be extended to the data in Mandarin Chinese. Since Krifka's detailed semantic analysis is not relevant to our main argumentation, his semantic account is laid out only in the Appendix for interested readers.

4. A proposal of negation under *yiqian*

To begin with, let me briefly introduce Beaver & Condoravdi's (2003) and Condoravdi's (2010) analyses of *before*-clauses. They argue that the basic meaning of *before* is just the temporal order

'<' between time intervals. When *before* takes a complement clause, the complement clause is analyzed as containing a type-coercion operator *earliest* that turns the complement clause, analyzed as a property of times of type <i,t>, into a definite time description (also see von Stechow 2009; Sharvit 2014). Under this analysis, *John left before Mary arrived* is interpreted as (18):

(18)   John left before the earliest time at which Mary arrived.

The earliest time is the left-most moment of time that precedes all the others in a set of left-bounded times. It can be defined as follows:

(19) $[\![earliest]\!] = \lambda P_{<i,t>}$. $\iota t \exists I[t \in I \wedge P(I) \wedge \forall t'[t' \in I \rightarrow t \leq t']]$.

I assume that properties of times are true of intervals, which consist of a set of times. In (19), *I* is an interval of which the property *P* is true. What (19) says is that when the *earliest* operator is applied to an interval that a property is true of, it picks out the time that precedes all the others in the set of times which constitute the interval.

Can the above theory of *before*-clauses explain why negation under *yiqian* has the same truth conditions as a *before*-clause without negation? The answer is bluntly NO. Consider (2) again, reproduced below.

(2)   Zhangsan **mei** shang daxue   yiqian, ta   jiu   yijing   hen   dongshi   le.
      Zhangsan **not** attend university before he   then already very sensible Par
      'Zhangsan had already been sensible before he went to a college.'

The coercion approach assigns (2) the following truth conditions: 'Zhangsan had already been sensible before the earliest time at which he did not attend a college'. But when is the earliest time at which he did not attend a college? This might be the time when Zhangsan was born. Such truth conditions are certainly incorrect.

Although the above theory does not answer the puzzle why a *yiqian*-clause negated by *mei* has the same truth conditions as a non-negated *yiqian*-clause, the insight that a *before*-clause is interpreted as containing a coercion operator provides different possibilities for what that operator can be.

Let me begin with the observation that *yiqian* seems to select only certain types of complement clauses. Take *jiehun yiqian* 'before getting married' for example. The situation described by *jiehun* 'marry' involves a change from a state of not having got married to a state of having got married. When a situation does not involve such a change of state, the use of *yiqian* sounds very weird as is shown by (20):

(20)   *Yi   jia   yi   dengyu   er   yiqian, ……
       one plus one equals   two   before
       'Before one plus one equals two,……'

Example (20) implies that there are times at which one plus one does not equal two. However, this is impossible because the proposition under discussion is a tautology.

Two more examples of a similar nature are given here:

(21) a. *Suoyoude sanjiaoxing dou you san-ge bian yiqian, ...
all triangles all have three-Cl side before
'Before all triangles have three sides, ...'
b. #John shi nansheng yiqian, ...
John be male before
'Before John was a male, ...'

Example (21a) is similar to (20) because the proposition that all triangles have three sides is a tautology and hence involves no potential change of state. As for (21b), whether or not a person is male is a property that does not change over time. Thus, (21b) sounds weird unless this sentence is understood as John having undergone some sex-change operation.

The above discussion suggests that the meaning of *yiqian* is sensitive to a possible change from non-existence to existence of a certain state of affairs. In what follows I shall refer to the state of affairs before the change as the prior nonexistent state of affairs (PS) and the state of affairs after the change as the resultant post-state of affairs (RS). Take another verb *lai* 'come', for example. The change of state associated with *lai* must be from the prior-state of having not come to the resultant post-state of coming or having come.

Notice that the change of state of affairs under discussion is a possible change rather than an actual change. For example, in (22) below, the sentence does not entail that Miss Li has actually got married. It only implies that it is a possible change of state of affairs.

(22) Li xiaojie jiehun yiqian, ta shi juedui bu hui sheng xiaohai de.
Li Miss marry before she be definitely not will give.birth child Foc
'Before Miss Li gets married, she will definitely not give birth to a child.'

The prior nonexistent state normally takes the form of (*hai*) *mei P* such as *Li xiaojie* (*hai*) *mei jiehun* 'Miss Li has not got married (yet)' and the resultant post-eventuality is the affirmative proposition such as *Li xiaojie jiehun* (*le*) 'Miss Li got married'.

I incorporate the above requirement of potential change of state of affairs into the meaning of *yiqian*-clauses. More precisely, I treat this as a presupposition, which explains why examples such as (20) are ill-formed.

(23) '*P yiqian*, *Q*' presupposes that a change of state associated with *P* from the prior non-existent state (PS) to the resultant post-state (RS) must be possible.

The time at which the change from PS to RS occurs will be referred to as the transition time. What *yiqian* means, I propose, is before the transition time, that is, before the change of state from PS to RS occurs. According to this analysis, (22) is paraphrased as: she will not give birth to a child before the change from the state of not having got married to the state of having got married occurs or before the time at which a change from not having got married to having got married occurs.

Interestingly, there are two ways to look at when a change of state occurs. If we view the change of state from the RS angle, which is normally expressed by an affirmative proposition, it is the earliest time at which the affirmative event is going to emerge. But if we view the change of state from the PS angle, which is expressed by a proposition negated by *mei*, it is the latest moment of time at which the negative state is going to end. These two times are just two sides of the same coin, as they can be regarded as the same borderline time. Given this, we can define the transition time at which a change of state from PS to RS occurs, as follows:

(24) Let f_{tt} be a function, which when applied to the denotation of the complement clause CP/IP of *yiqian*, yields the transition time as defined below:

f_{tt} ($[\![$CP/IP$]\!]$) = (i) the earliest time of the interval denoted by CP/IP, when CP/IP is RS.
(ii) the latest time of the interval denoted by CP/IP, when CP/IP is PS.

Since the latest moment of time at which the prior nonexistent state is true abuts, that is, precedes and is adjacent to the earliest time of the interval at which the resultant post-state is true, the two moments of time can be said to be virtually at the same point of time. Thus, saying 'before the earliest time of the interval at which RS is true' is truth-conditionally indistinguishable from saying 'before the latest time of the interval at which PS is true'. This, I claim, is the reason why the negation marker *mei* under *yiqian* does not have any semantic effect on the truth conditions.

To support the proposal that the semantic interpretation of *yiqian* is sensitive to the edge of a situation, that is, the transition time at which a change from PS to RS occurs, I would like to first motivate the need to use the beginning or ending point of an interval in interpreting a temporal connective.

Zhang (2013) observed a very interesting meaning contrast between Mandarin Chinese and English in the following two sentences.

(25) Women shi [daxue yihou] renshi de.
we be college after know Part
'We met after (the beginning of) college.'

(26) We met after college.

He pointed out that while *daxue yihou* 'after college' in (25) may denote a period following the beginning, that is, the earliest, point of the duration denoted by *daxue* 'college', *after college* in (26) denotes a duration after the ending point denoted by *college*. However, not every duration NP is interpreted the same way. For example, according to him, in (27), *nianhui yihou* 'after the annual meeting' is construed as 'after the end of the annual meeting', similarly to its English counterpart.

(27) Tamen shi [nianhui yihou] renshi de.
they be annual meeting after know Part
'They met after the end of the annual meeting.'

Zhang further observed that the choice of the beginning or ending point of a duration NP is not arbitrary. Only those duration NPs that 'represent a stage, or a phase, in a sequence of similar

entities' allow 'NP + *yihou*' to denote the period after the beginning point of the duration NP. The notion of stage or phase is illustrated by {… kindergarten, elementary school, middle school, high school, college, graduate school, …}, namely 'phases that occur consecutively in temporal order, with no time breaks in between'. NPs that do not meet the 'Consecutive Requirement' only allow the ending point reading. He has done an extensive experimental study that confirms the above intuition judgment.

Finally, Zhang mentioned that how 'NP + *yihou*' is interpreted also depends upon the context of utterance. Given an appropriate context, a consecutive NP may also denote the final point, as the following contrast shows.

(28) a. Daxue   de-shihou   wo   hen   shou,   daxue   yihou   wo   pang   le.
         college   when   I   very   skinny college after   I   fat   Perf
         'During college I was skinny; after college I became fat.'
     b. Daxue   yiqian   wo   hen   shou,   daxue   yihou   wo   pang   le.
         before   college   I   very   skinny college after   I   fat   Part
         'Before college I was skinny; after college I became fat.'

Zhang's above discussion of 'NP + *yihou*' has important implications. It shows that one and the same temporal connective may pick out either the beginning or ending point of the interval denoted by its complement constituent as the reference point of the precedence relation imposed by the temporal connective. A second important implication is that temporal connectives in different languages may impose different restrictions on the use of the beginning or ending point for a certain temporal connective.

In this regard, note that Heinämäki (1974) also observed that different aspectual classes may influence the choice of initial or final point of an interval denoted by its complement clause. In English, *after*-clauses mostly refer to the initial point of the interval specified by the complement clause. However, when the complement clause is an accomplishment, it is the final point that is relevant to the interpretation. For example in (29a), the *after*-clause is interpreted as 'after the final point of having made the statue', but in (29b), the *after*-clause is construed as 'after the initial point of being dark'.

(29) a. John became famous after he made the statue.
     b. There was a huge crowd after it was dark.

In light of the above discussion, I take it as plausible that *yiqian*, being a temporal connective, may choose either the initial or final point of a specified interval as the reference time, that is, the transition time, depending on whether its complement clause represents a PS or RS. Here it is worth emphasizing the parallelism between *yiqian* and *yihou* with regard to the choice of the earliest or latest point of time as the reference time. Just as the interpretation of *yihou* is sensitive to whether or not its complement clause is a consecutive NP, the interpretation of *yiqian* is sensitive to whether the embedded clause represents a PS or RS, which are two adjacent states of affairs.

In fact, when discussing the distinction between (*yi*)*qian* and (*yi*)*hou*, Wang (2004:433) made similar remarks. He notes that while expressions such as *san-ge xiaoshi yiqian* 'three hours earlier' and *wu-ge yue zhiqian* 'five months earlier' take the beginning point of the temporal NPs as the

reference time, expressions such as *shi tien hou* 'ten days later' and *ershi nian yihou* 'twenty years later' take the ending point of the temporal NPs as the reference point.[5] So, the choice of the beginning or final point of a given temporal NP as the reference time is clearly related to which temporal connective, (*zhi*)*qian* or (*zhi*)*hou*, is used. He also points out that choice of the reference time is influenced by the nature of the temporal expression embedded in (*zhi*)*qian* or (*zhi*)*hou*. He suggests that '*mei* VP *zhiqian*' takes the final point as the reference time and the final point is the VP event. So the reference time of '*mei* VP *zhiqian*' is the same as the reference time of 'VP *zhiqian*' (Wang 2004:433). In either case, the reference time is the VP. Wang's comment on the initial versus final point is very short and I am not able to completely follow his explanation. However, it seems that the analysis proposed in this article shares the same spirit as his suggestion by looking at the initial or final point of the event denoted by the complement clause of *yiqian*. In what follows, I shall further develop the above idea and explain in detail how the analysis works.

That *yiqian* is sensitive to a change of state and chooses the transition time as the reference time is supported by two interesting fixed temporal expressions in Mandarin Chinese, namely, *sheng qian* 'before being alive' and *si qian* 'before death' given below.

(30) a. Ta   sheng   qian   hen   kangkai.
         he   alive   before   very   generous
         'He was very generous when he was alive.'
     b. Ta   si   qian   hen   zhengzha.
         he   die   before   very   struggle
         'He struggled a lot before he died.'

The morpheme *qian* 'before' is a shortened form of *yiqian* 'before' or *zhiqian* 'before' but is used only as a fixed expression in *sheng qian* 'before being alive' and *si qian* 'before death'. What is interesting about the two fixed expressions is that both refer to a period of time when one is alive. *Sheng qian* denotes a longer period which may cover most of a person's life, whereas *si qian* focuses more on a shorter period right before one's death, which may range from a few minutes to a few months. The question now is this: Why do *sheng qian* and *si qian* both refer to an interval when one is alive? We have an easy answer to this question under the proposed analysis of *yiqian*. As proposed, (*yi*)*qian* picks out the transition time of its complement clause as the reference time and a *yiqian*-clause is always interpreted as before the transition time at which a change of state associated with the complement clause occurs. For *sheng* 'alive' and *si* 'dead', the associated change of state is always from a state of being alive to a state of being dead, rather than the other way around.[6] So for *sheng* 'alive', its associated transition time must be the latest moment of time at which one is alive and for *si*, its associated transition time must be the earliest time when one is

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[5] Note that (*zhi*)*qian* and (*zhi*)*hou* here are not really equivalent to *before* and *after* but to *earlier* and *later*, though they are homophonous.

[6] Note that I assume that *sheng* 'alive' has no prior negated state, because not being alive means being dead, but being dead is the post-state rather than the prior-state. This might be the reason why we have *sheng qian* 'before being alive' but do not have *mei sheng qian 'before not being alive'.

dead. In other words, *sheng qian* is interpreted as 'before the latest moment of time at which one is alive', whereas *si qian* 'before being dead' can be paraphrased as 'before the earliest time at which one is dead'. But these two times are almost indistinguishable, so both *sheng qian* and *si qian* refer to an interval when one is alive, as shown by the dotted interval in the following diagram, though their focus is slightly different.

(31)

Diagram 1
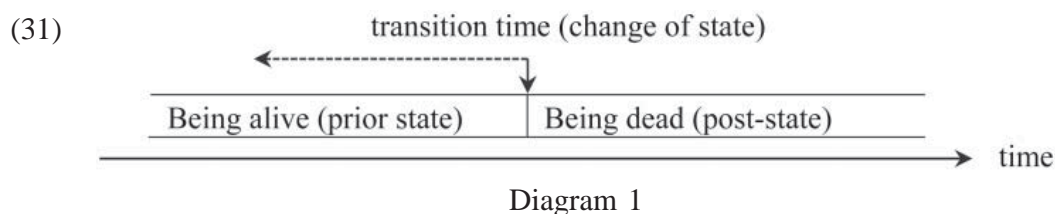
Similar analyses apply to our earlier examples (1) and (2), reproduced below, but the focus effect is less obvious.

(1)   Zhangsan   shang   daxue   yiqian, ta   jiu   yijing   hen   dongshi   le.
       Zhangsan   attend   university   before   he   then   already   very   sensible   Par
       'Zhangsan had already been sensible before he went to a college.'

(2)   Zhangsan   **mei**   shang   daxue   yiqian, ta   jiu   yijing   hen   dongshi   le.
       Zhangsan   **not**   attend   university   before   he   then   already   very   sensible   Par
       'Zhangsan had already known many things before he went to a college.'

It must be the case that the state of having not gone to a college precedes the resultant post-state of having gone to a college and the transition time is the borderline between the two states in question. Diagram 2 below illustrates where the transition time is located, that is, the earliest time at which going to a college is true, and Diagram 3 is a schematic representation of the truth conditions of (1).

(32)

Diagram 2
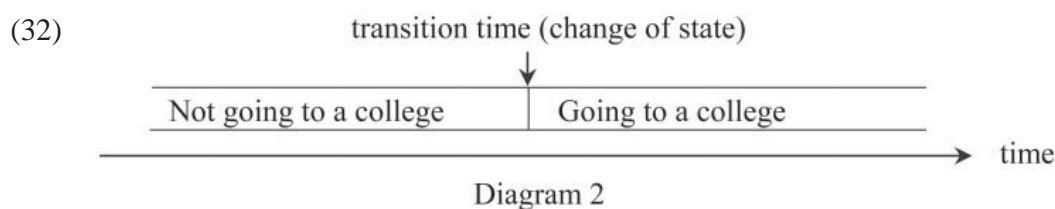
(33)   grey area: before the earliest time of the college-going interval
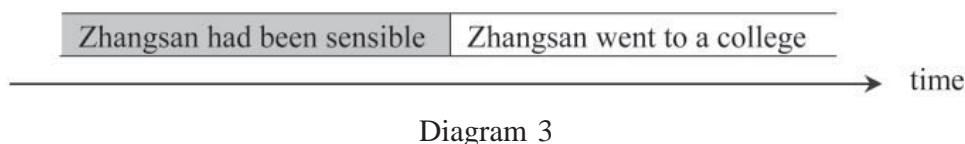
Diagram 3

When the *yiqian*-clause is a proposition negated by *mei* denoting the prior-state before the change of state, the semantic computation is almost the same except that we have to replace the *earliest*

time with the *latest* time, as Diagram 4 shows. Since the earliest time of the resultant post-state, that is, having gone to college, is indistinguishable from the latest time of the nonexistent state, that is, not having gone to a college, (1) and (2) are truth-conditionally indistinguishable.

(34) grey area: before the latest time of the interval at which Zhangsan has not gone to a college

before the latest time of the interval at
which Zhangsan did not go to a college
= before the earliest time of the interval
at which Zhangsan went to a college

Zhangsan had been sensible
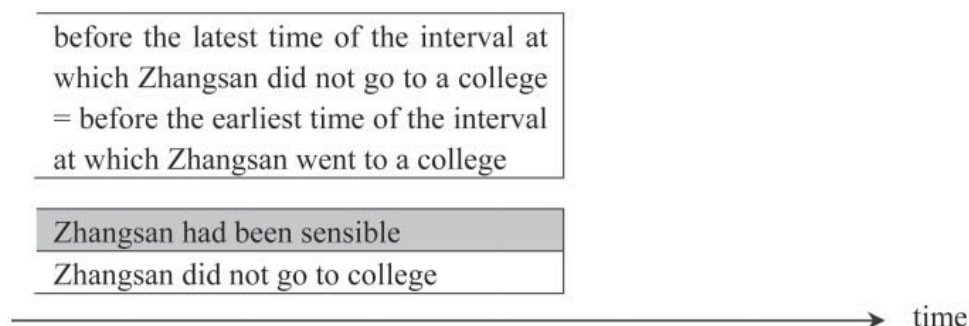Zhangsan did not go to college

→ time

Diagram 4

This accounts for the mysterious puzzle of why negation by *mei* under *yiqian* does not seem to have a significant semantic effect on the truth conditions of the sentence.

Before moving on to the next section, I would like to point out one advantage of the above analysis. As noted, though both *sheng qian* and *si qiang* refer to a period of time when one is alive, an obvious temporal contrast between them is that the former focuses on a much longer period of time of one's life before death, whereas the latter focuses more on an interval or time point closer to the time when one dies. This fact can have an explanation according to our analysis. I suggest that it is the distinction between 'earliest' and 'latest' that accounts for such a meaning difference. When 'the earliest time' of an emerging dying event is put in focus, this time point becomes the pragmatically most relevant time point and therefore the further a time point is away from it, the less likely it is to be relevant to the matrix event. By contrast, by mentioning the last time point of being alive, the speaker is suggesting that one's life until the last minute is related to the matrix event. Such an account can be extended to the contrast between 'VP-*zhiqian*' and '*mei* VP-*zhiqian*'. Indeed, in discussing the temporal difference between these two constructions, Wang (2004) mentioned that though both 'VP-*zhiqian*' and '*mei* VP-*zhiqian*' take the event denoted by VP as the reference time, they pick out different times as being relevant to the matrix event time (also see Xu 2008 for this point). For the former, it is times that are closer to the time of VP that are relevant to the matrix event, whereas for the latter, it is times that are further away from the VP time or the time of the whole prior non-actualized state that is relevant.[7] If this account is correct, it suggests that the negation marker *mei* under *yiqian* is actually interpreted rather than being expletive. In this sense, negation under *yiqian* in Mandarin Chinese is closer to expletive negation under *bevor* in German than true expletive negation in Catalan, because in both Mandarin Chinese and German the negation markers are interpreted. (See Appendix for discussion of the German data.)

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[7] I refer the reader to Wang's (2004) article for empirical evidence for such a claim. He also made an interesting observation that 'VP + *yiqian*' and '*mei* VP + *yiqian*' are sometimes not interchangeable, especially when the *yiqian*-clause contains words such as *lin* 'approach', *ji jiang* 'is going to' or *zhe ci* 'this time', etc. Also see Shi (2010) for a similar observation.

5. Comments on previous analyses

As noted in the introduction, Lien (1979) seems to be the first Chinese linguist who tried to explain why the presence of (*hai*) *mei* 'not yet' in the complement clause of *yiqian* does not have a semantic effect. He pointed out that in a '*B yiqian*, *A*' construction, it must be the case that the event denoted by *B* has not taken place up to the time of the event denoted by *A*. Thus, the presence of negation such as *hai mei* 'not yet' under *yiqian* is an explicit reflection of this logical structure. He argued that the presence of *yiqian* entails that message. Since *hai mei* is redundant, it is elliptical. Similarly, the presence of *hai mei* also makes *yiqian* redundant, so *yiqian* is elliptical, too, as is shown by his example:

(35) Yisheng   hai   mei   lai,   Zhangsan   jiu   si   le.
     doctor   yet   not   come   Zhangsan   then   die   Asp
     'Before the doctor came, Zhangsan died.'

Lien's proposal is a very interesting one, but encounters some difficulties. Let's begin with the suggestion that when the presence of an element entails the falsity of a proposition, the negation marker is optionally present. If the presence of *mei* under *yiqian* really reflected the logical structure as Lien suggested, then one should expect *mei* to be optional in the following counterfactual construction:

(36) a.   Wo   hai   yiwei   ta   lai-le.
        I   originally   think   he   come-Asp
        'I thought he came, (but he didn't).'
     b.   Wo   hai   yiwei   ta   mei   lai.
        I   originally   think   he   not   come
        'I thought he didn't come, (but he did).'

The use of *hai yiwei* 'originally think' induces a counterfactual meaning in Mandarin Chinese. Thus, (36a) entails that the complement clause is false, that is, you didn't come in the actual world. Now, if the negation marker *mei* is added to the complement clause as in (36b), Lien's redundancy account predicts that the meaning of the sentence should not be affected. Unfortunately, this prediction is incorrect. The negation marker *mei* in (36b) must receive an independent interpretation. In contrast to (36a), (36b) entails that he came in the actual world. This casts doubt on Lien's account for negation under *yiqian* in terms of 'logical structure' and redundancy.

Second, we find the claim that *yiqian* is elliptical when *hai mei* is present to be dubious. Note that deletion of *yiqian* often leads to a completely different meaning. For example, compare (37a) with (37b).

(37) a.   Li   xiaojie   (mei)   sheng   xiaohai   yiqian,   ta   changchang   yundong.
        Li   Miss   not   give.birth   child   before   she   often   exercise
        'Before Miss Li gave birth to a child, she often did exercises.'

    b.   Lixiao   jie   (hai)   mei   sheng   xiaohai,   ta   changchang   yundong.

       Li   Miss   yet   not   give.birth   child   she   often   exercise.

       'Miss Li hasn't given birth to a child. She often does exercises.'

(37a) implies that Miss Li has given birth to a child and before she had a child, she did exercises often. By contrast, (37b) implies that Miss Li hasn't given birth to a child, that is, she has no child at all, and she often does exercises. This indicates that *yiqian* must contribute to the semantic interpretation of the sentence rather than redundantly conveying the same relation as *hai mei* 'not yet'.

    Third, Lien did not say clearly how a clause is interpreted when *mei* and *yiqian* are both present. According to his account, both *mei* and *yiqian* are elliptical. This in turn implies that both are semantically vacuous, not just *mei*. This assumption, however, immediately encounters a difficulty when *yiqian* appears but *mei* is absent.

    Due to the aforementioned difficulties, I did not pursue the approach advanced by Lien.

    In addition to Lien's works, we also found some sporadic remarks on the co-occurrence of *mei* with *yiqian* in the literature. Wiedenhof (1994:121) mentioned the idea that 'before something is done, it is not done', but he did not propose a more concrete analysis explaining why '*mei you* and *yiqian* co-occur without yielding the logical sum of their meanings'. Wang's (2004) article contains more detailed descriptions of the temporal contrast between 'VP-*zhiqian*' and '*mei* VP-*zhiqian*', but he did not address the compositionality problem of *mei* and *yiqian*. Xiao & McEnery (2008) suggested that the function of *mei* is to negate realization and is therefore 'compatible with the non-realization of the situation denoted by VP *qian/yiqian/zhiqian*', but this short remark cannot answer the compositionality problem of *mei* and *yiqian* either.

6. *Yiqian* 'before' versus *yihou* 'after'

    At this point, it might be interesting to compare *yiqian* 'before' with *yihou* 'after'. Unlike *yiqian*, *yihou* does not license semantically empty negation. Compare (38a) with (38b). The meanings of the two sentences are completely different. In (38a), it is living in Taipei that causes him to become strange, whereas in (38b) it is not living in Taipei that causes him to become strange. Clearly, *mei* 'not' in (38b) is interpreted as true negation.

(38) a. Ta zhu zai taibei yihou, ren   jiu   bian   de   guaiguai de.

          he   live   at   Taipei after   person then   become DE   strange   PAR

          'He has become very strange since he lived in Taipei.'

      b. Ta mei zhu zai taibei yihou, ren   jiu   bian   de   guaiguai de.

          he   not   live   at   Taipei after   person then   become DE   strange   PAR

          'He has become very strange since he did not live in Taipei.'

To account for this fact, I propose that the semantics of *yihou* remains constant no matter whether the clause embedded to *yihou* is an affirmative or negative clause. As long as the complement clause is a state, be it a positive or negative state, the reference time is always set to be the initial time of the state. Thus the *yihou*-clause in (38a) means 'After the earliest time at which he lived in Taipei' and the *yihou*-clause in (38b) means 'After the earliest time at which he did not live in Taipei'. In

other words, there is no similar change of state effect that we saw in *yiqian*-clauses. However, it is not true that *yihou* always involves the *earliest* operator. As we saw, when the complement clause of *yihou* is an accomplishment, the reference time is the latest time of the interval denoted by the complement clause. For example, the *yihou*-clause in (39) should be interpreted as 'after the latest time of the interval at which the proposition that Zhangsan bought a house is true.'

(39) Zhangsan mai-(le) na-dong fangzi yihou, ta jiu   mei you shenme cunkuan le.
      Zhangsan buy-Perf that-Cl house after he then not have what   savings Asp
      'After Zhangsan bought that house, he did not have many savings left.'

Thus, following Heinämäki's (1974) analysis of English *after*, I assume that the reference time of *yihou*-clauses is determined by aspectual classes and is always the initial time, unless the complement clause of *after* is an accomplishment that picks out the latest time of the interval at which the complement clause is true as the reference time. The meaning difference between (38a) and (38b) can be represented by the following diagram.
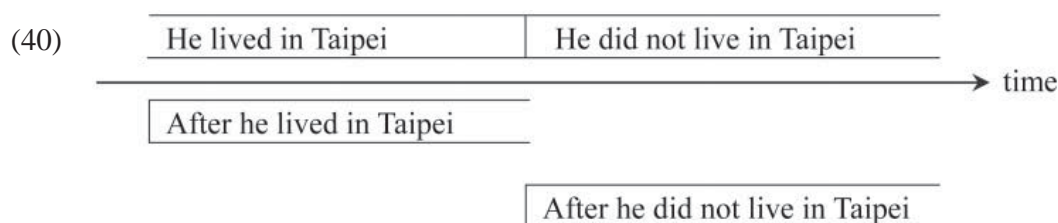
(40)

Diagram 5

As we can see from this diagram, it is clear that 'after he lived in Taipei' and 'after he did not live in Taipei' do not refer to the same interval. This explains why negating a *yihou*-clause is different from negating a *yiqian*-clause.

7. Expletive negation from a cross-linguistic perspective

As discussed in the Introduction, expletive negation is attested in many different languages including Catalan, Italian, German, and Mandarin Chinese, and so on. However, the properties of expletive negation in these languages are all different. Given this cross-linguistic variation, it is interesting to explore why such a variation exists and how one might account for it. In this section, I shall offer some speculation about such variation, but I shall not be able to engage in an in-depth analysis of the variation due to my lack of knowledge about Catalan, Italian, and German.

The first issue to tackle for the cross-linguistic variation on expletive negation is the distribution issue. As we saw, expletive negation in Catalan occurs in a much wider context than its occurrence in German or Mandarin Chinese. Essentially, all non-veridical contexts license expletive negation in Catalan; but in German and Mandarin Chinese, expletive negation is allowed only in *before*-clauses. German further distinguishes itself from Mandarin Chinese by having the additional requirement that the matrix clause must contain a negation marker. And we also have languages such as English which do not allow expletive negation at all. I propose that such

cross-linguistic variation might have to do with two parameters. One parameter is provided by negation markers and the other parameter is provided by the semantics of *before* and its counterparts in different languages. A negation marker in a language may be specified as either [+interpretable] or [–interpretable]. A negation marker with the [–interpretable] feature must be checked syntactically and eliminated. Expletive negation in Catalan is of this type. Since a great many expressions, namely those non-veridical operators, may contain a negation feature with [+interpretable] feature, they can check the [–interpretable] negation marker and 'absorb' it, to use Espinal's terminology. This accounts for why expletive negation in Catalan occurs in a very wide context and is semantically vacuous. The distribution is wide because there are many feature checkers with [+interpretable] negation feature that check the [–interpretable] feature that a negation marker carries. Expletive negation in such languages is not true negation, because the negation marker is specified as [–interpretable] and the feature is totally eliminated at the conceptual level.

On the other hand, negation markers in some languages such as Mandarin Chinese, German, and English are perhaps [+interpretable] only. So they do not need to look for feature-checkers to eliminate or absorb the [+interpretable] negation feature. Consequently, either expletive negation does not exist at all (as is the case in English) or, if it is allowed, its distribution is severely constrained because the contexts that license it result from some factor. One such factor, I suggest, is the possibility of introducing the transition operator rather than the earliest operator under the scope of *before*. If Beaver & Condoravdi's (2003) analysis is correct for English *before*, then *before* is associated with the *earliest* parameter only. However, as I have argued in this article, Chinese *yiqian* 'before' uses the transition operator that picks out the time at which a change occurs from a nonexistent state to a resultant post-state. In this language, it is the availability of the transition operator that makes a negation operator under the scope of *yiqian* behave like an expletive marker, though the negation marker carries a [+interpretable] feature. In German, by contrast, it is the matrix negation operator that licenses expletive negation under the scope of *bevor*, as suggested by Krifka.

To make a more complete typological variation on expletive negation, it is worth mentioning that citing Buechel's (1939:251) following example, Thompson et al. (2007:248) pointed out that in Lakhota the negative marker *ni* in the past tense is obligatory under 'before':

(41) T'e   ni   it'okab   c'inca-pi   kin   wahokon-wica-kiye.
       die   Neg   before   child-Pl   the   admonish-3Pl.Patient-admonish
       'Before he died, he admonished his children.'

Again, the author does not have enough knowledge of the Lakhota language to analyze the relationship among tense, negation, and 'before'. So this is a typological issue that must wait for another occasion.

A final note on the relationship between negation and 'before' has to do with negative polarity items. It is a well-known fact that negative polarity items such as *any* or *ever* are licensed under 'before' (Heinämäki 1972; Ladusaw 1979, among others). Although it is beyond the scope of the present paper to discuss this issue, we note that this property might have an answer given the fact that expletive or redundant negation is used under 'before' in so many typologically unrelated languages. It is very likely that an NPI is licensed under 'before' precisely because (expletive) negation is in the structure, though such negation is only optionally present in some languages.

8. Conclusion

This article began by asking the question, why does negation under *yiqian* in Mandarin Chinese not have an effect on the truth conditions of the sentence? After having shown that neither Espinal's absorption approach nor Krifka's semantic approach can be extended to account for negation under *yiqian* in Mandarin Chinese, I have argued that the seemingly semantically vacuous negation in Mandarin Chinese is a consequence of the transition operator that *yiqian* introduces. When the complement clause is an affirmative proposition representing the resultant post-state, the transition operator picks out the earliest time of the post-state as the reference time, as is the case for English *before*. When the complement clause is a negated proposition representing the prior nonexistent state, the transition operator picks out the latest time of the nonexistent state as the reference time. Since the two times are indistinguishable in terms of the temporal precedence relation that *yiqian* imposes, negation by *mei* under *yiqian* does not have a semantic effect on the truth conditions.

In addition to accounting for the Mandarin Chinese data, this article has also tried to explore the cross-linguistic variation in expletive negation attested in many different languages, in particular, Catalan, Italian, and German. I have argued that the typology of expletive negation might be a consequence of two parameters. One is the [±interpretable] feature that a negative constituent carries, and the other is the availability of the transition operator that *before* or its counterparts in different languages allow. If a negation marker has a [–interpretable] feature, then it is not an interpretable element at the conceptual level and needs to look for an element with a [+interpretable] negation feature to eliminate or absorb the [–interpretable] feature in order for the sentence to be fully interpreted. The distribution of such expletive negation is wide because many expressions have a [+interpretable] feature to check with the [–interpretable] feature that a negation marker bears. By contrast, if a negation marker bears a [+interpretable] feature, it will not need to be checked against another [+interpretable] negation feature. Such negators can only be fake expletives, as is the case for Mandarin Chinese *mei*. In such languages, fake expletive negation arises as a result of the use of the transition operator, as is the case in Chinese or the matrix negation as in German.

Appendix

In this Appendix, I shall demonstrate Krifka's analysis of expletive negation in German. For readers not familiar with logical semantics, this appendix can be ignored, because the details of his analysis will not affect the argument in the text.

Krifka (2010a, 2010b) analyzed *before* as temporal negation. He proposed that the *before*-clause is negated for all times at or before the time at which the main clause is evaluated and the meanings of the *before*-clause and the main clause are combined conjunctively.

(1)   a. $[\![\textit{before } B]\!]^n = \lambda t \ \neg \exists t'[t' \leq t \wedge [\![B]\!]^n (t')]$

        b. $[\![[A \ [\textit{before } B]]]\!]^n = \lambda t [[\![A]\!]^n (t) \wedge [\![\textit{before } B]\!]^n (t)]$

            $= \lambda t [[\![A]\!]^n (t) \wedge \neg \exists t'[t' \leq t \wedge [\![B]\!]^n (t')]$

In (1), '$\leq$' expresses a precedence or overlap relation between two intervals.

According to the above analysis, a sentence such as (2a) is interpreted as (2b), where *n* is the utterance time.

(2) a. Mozart died before he finished his requiem.
   b. $[\![\textit{Mozart finished his requiem}\,]\!]^n = \lambda t[t < n \wedge$ Mozart finishes his requiem at t])
     $[\![\textit{Mozart died}]\!]^n = \lambda t[t < n \wedge$ Mozart dies at t]
     $[\![\textit{before Mozart finished his requiem}]\!]^n$
     $= \lambda t\, \neg\exists t'[t' \leq t \wedge [t' < n \wedge$ Mozart finishes his requiem at t']]
     $[\![\textit{Mozart died before he finished his requiem}]\!]^n$
     $= \lambda t[t < n \wedge$ Mozart dies at t $\wedge$
     $\neg\exists t'[t' \leq t \wedge [t' < n \wedge$ Mozart finishes his requiem at t']]]

The resulting meaning (the free tense variable *t*) is then closed by an assertion operator as follows, deriving the following meaning: Mozart dies at a time *t* before the utterance time *n* and there is no time *t'* prior to Mozart's time of death at which Mozart finishes his requiem.

(3) $[\![\text{ASSERT}]\!]^n([\![\textit{Mozart died before he finished his requiem}]\!]^n)$
   $= $ asserted: $\exists t[t < n \wedge$ Mozart dies at t $\wedge$
   $\neg\exists t'[t' \wedge t \wedge$ Mozart finishes his requiem at t']]

Since common sense tells us that one cannot finish a requiem after one's death, it follows that Mozart was not able to finish his requiem after his death. The non-factual reading of the *before*-clause is thus derived.

   However, it is often the case that a *before*-clause implicates the truth of the complement clause of *before* as in (4).

(4) Mr. Maier met Mrs. Schmidt before he met Mr. Schmidt.

According to Krifka, this can be derived from general conversational principles which I will not discuss in detail.[8] He reasoned that if [A *before* B] claims that B was not true before A became true, but implicates that B is probably true or even true, then this amounts to implying that B became true after A became true. In Krifka (2010a), this 'reified implicature' is 'folded into' the lexical meaning of *bevor*. So the adverbial clause [*before* B] and the proposition [A *before* B] are interpreted as follows, where conversational implicatures are implemented in the form of ⟨α, β⟩, where α is the core meaning, and β the implicature.

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[8] Krifka argued that the implicature in question can be derived from Grice's (1975) Cooperation Principle, as follows. The sentence [A *before* B] states that B is not true before the time at which A is true. This statement competes with the stronger statement that B never is the case. Since the stronger statement is not used, one infers that B is false. This is equivalent to implying the truth of B. Such an implicature is cancellable, however. For example, the implicature of (4) is cancelled in (i) below.
  (i) Mr. Jones met Mrs. Smith before he met Mr. Smith—in fact, he never met him at all, because they divorced soon after.

(5) $[\![before\ B]\!]^n$
        $= \langle \lambda t \neg \exists t'[t' \leq t \wedge [\![B]\!]^n(t')], \lambda t \exists t'[t < t' \wedge [\![B]\!]^n(t')] \rangle$

(6) $[\![A\ [before\ B]]\!]^n$
        $= \langle \lambda t[[\![A]\!]^n(t) \wedge \neg \exists t'[t' \leq t\ [\![B]\!]^n(t')]], \lambda t[[\![A]\!]^n(t) \wedge \exists t'[t < t' \wedge [\![B]\!]^n(t')]] \rangle$

Krifka proposed that the composition of meanings is such that the core meaning and the reified implicature are computed in parallel so that when $\langle \alpha, \beta \rangle$ is combined with a meaning of γ, the result is a meaning $\langle (\gamma, \alpha), (\gamma, \beta) \rangle$, where (γ, α), (γ, β) stand for regular meaning composition.

The aforementioned assertion operator applies to both the core meaning and the implicature, as follows:

(7) $[\![ASSERT]\!]^n = \lambda\langle p, p' \rangle$ [asserted: $\exists t[p(t)]$, implicated: $\exists t[p'(t)]$]

With the above mechanisms, Krifka explained the problem of expletive negation under *before* such as (8), as follows.

(8)   Maria schlief nicht ein bevor nicht Hans zuhause war.
        'Maria didn't fall asleep before Neg Hans was home.'

He proposed that negation under the scope of *before* is 'proposition negation', as defined below:

(9) $[\![nicht_p\ A]\!]^n = \lambda t \neg[[\![A]\!]^n(t)]$

(10) $[\![nicht_p\ [Hans\ zuhause\ war]]\!]^n = \lambda t \neg[t < n \wedge \text{Hans is home at t}]$

The combination of *bevor* with the negated proposition results in the following two-dimensional meaning, one dimension being the core meaning and the other one the implicature:

(11) $[\![bevor\ [nicht_p\ [Hans\ zuhause\ war]]]\!]^n$
        $\langle \lambda t \neg \exists t'[t' \leq t \wedge \neg[t' < n \wedge \text{Hans is home at t'}]],$
        $\lambda t \exists t'[t < t' \wedge \neg[t' < n \wedge \text{Hans is home at t'}]] \rangle$

The core meaning applies to times *t* that are not equal or preceded by a time *t'* at which 'Hans is not home' is true. According to Krifka, this is logically equivalent to saying that the core meaning is a predicate that applies to all time *t* such that Hans is home at *t* and at all earlier times:

(12) $\lambda t \forall t'[t' \leq t \rightarrow [t' < n \wedge \text{Hans is home at t'}]]$

This means that when applied to a time *t*, Hans must be home at all earlier times and in fact must be home from the beginning time onward. This is simply false. So Krifka replaced that formula by falsity '$\perp$' (Krifka 2010a:230). Thus, the *before*-clause in (11) does not apply to any time, except that it carries the implicature that *t* is followed by a time *t'* at which Hans is not at home. This is

a strange result, but he argued that when combined with a matrix negation, the core meaning reduces to truth, as it is a tautology.

According to Krifka, matrix negation is assertional negation. When it applies to a two-dimensional meaning, both the core meaning and the implicature are negated as (13) indicates.

(13) $[\![nicht_a\ A]\!]^n = \lambda\langle p, p'\rangle$ [asserted: $\neg\exists t[p(t)]$, implicated: $\neg\exists t[p'(t)]$

Applying this to (8) results in the following meaning:

(14) $[\![nicht_a]\!]^n([\![[Maria\ schlief\ ein]\ [bevor\ [nicht\ Hans\ zuhause\ war]]]\!]^n)$
= asserted: $\neg\exists t[t < n \wedge \text{Maria falls asleep at } t \wedge \bot]$, = Tautology
implicated: $\neg\exists t[t < n \wedge \text{Maria falls asleep at } t \wedge$
$\exists t'[t < t' \wedge \neg[t' < n \wedge \text{Hans is home at } t']]$

According to Krifka, '$\lambda t[\text{Maria falls asleep at } t \wedge \bot] = \lambda t[\bot]$, and $\neg\exists t[\bot] = \top$'.

Therefore, the core meaning is always satisfied; it is a tautology. Consequently, the implicature is the only meaning contribution. It states that no time t is such that Maria falls asleep at t, and that t is followed by a time t' at which Hans was not home. Krifka said that this captures the right truth conditions, as the following diagram shows:

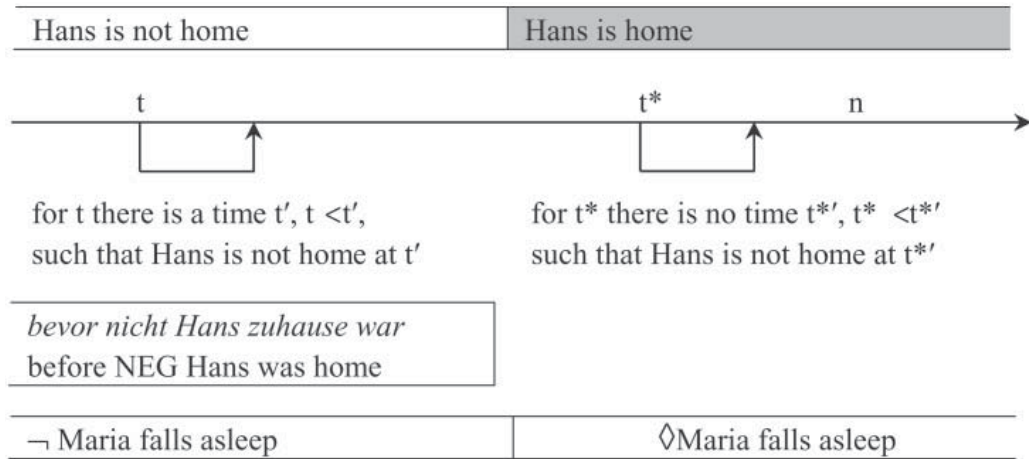(15)   Diagram for *Maria schlief nicht ein bevor nicht Hans zuhause war*

Diagram 6

As he noted, however, negation in the main clause is crucial for expletive negation under *bevor*, because the falsity of the second conjunct of the core meaning makes the clause necessarily false, as (16) shows:

(16)   *Maria schlief ein bevor nicht Hans zuhause war.*
= asserted: $\exists t[\text{Maria falls asleep at } t \wedge \bot]$, = $\bot$
implicated: $\exists t[\text{Maria falls asleep at } t \wedge \exists t'[t < t' \wedge \neg[\text{Hans is home at } t']]$

Extending Krifka's insights into the role of pragmatic considerations for the behavior of 'expletive' negation, Delfitto (2013) has proposed an alternative analysis that eliminates certain unnecessary stipulations of the former analysis. It is beyond the scope of this paper to review either Krifka's or Delfitto's analysis in detail. It suffices for us to point out that Krifka's analysis cannot be extended to the Chinese data. As we saw earlier, matrix negation is not a factor in licensing expletive negation in *before*-clauses in Mandarin Chinese. Krifka's analysis predicts that the Chinese examples such as (2) and (3b) in the main text are false sentences by definition, which is contrary to fact.

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中文的否定性「以前」子句與虛否定的跨語言差異

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　　本文主要探討爲何否定中文的「以前」子句不會對整個句子的真假值條件產生影響。「以前」的一個主要特質就是其補語子句所指稱的情狀必須是一個可變事態，變化之前的先前事態，通常以否定句來表達，是肯定句所表達的事態尚未存在的狀態，變後狀態則是進入該肯定事態的狀態。「以前」的語意會根據其補語子句究竟表達先前事態或是變後事態來選擇事態的最終點或起始點作爲語意解釋的參考點。否定子句選擇事態的最後時間點當作參考點，肯定子句選擇事態的最初時間點當作參考點。「以前」底下的否定不改變句意，其主要原因就是因爲「否定事態的最後一個時間點以前」和「肯定事態的最初時間點以前」所表達的意思是幾乎不可區分的。除了對中文「以前」底下的否定做深入的研究，本文也探討不同語言間虛否定的跨語言差異如何解釋，我們提出不同語言間虛否定分布的寬窄主要取決於一個語言否定詞究竟是 [+可解釋] 或是 [−可解釋] 所決定，[−可解釋] 的否定詞，虛否定用法分布較寬，因爲認可詞較多，[+可解釋] 的否定詞虛否定用法則分布較窄，因爲其語意解釋是獨立的。

關鍵詞：以前，以後，虛否定，冗餘否定