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## 漢語時制與時態的進一步研究 1/2

A Further Study of Tense and Aspect in Chinese

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### 一、中文摘要

本研究計畫的主要目的是延續我們在過去兩年有關漢語時制與時態的研究，在過去兩年，我們已經深入地探討了時態助詞「著」、「了」、「過」的時間意義，也對漢語時間指涉的方式作了非常完整的探討，我們的研究成果已經出在 *Language and Linguistics* 2000, *Lingua* 2002, *Linguistics* 2003, *Tsinghua Journal of Chinese Studies* 2003 以及 *Journal of East Asian Linguistics* 2003。可是我們過去的研究尚留有幾個議題需要進一步討論及研究，這一次的研究計畫主要就是要針對那些尚未觸及的議題作深入之討論，以便讓語言學家對於漢語的時制與時態有更完整的瞭解。我們在這次的計畫裡主要研究的是補語子句的時間解釋，特別是我們研究了文獻上所謂的 Sequence of Tense (時制呼應)、the backward shifted reading (時間后置解釋)，the forward shifted reading (時間前置解釋)，the simultaneous reading (時間重疊解釋) 及 the double access reading (時間雙指解釋) 在漢語中的情形。我們提出漢語補語子句的時間解釋主要受下列因素決定：

- (i) 補語子句述語的動靜態區別。
- (ii) 補語子句的完整態與非完整態區別。

(iii) 時間副詞是否出現及出現於主要子句或補語子句的區別。

(iv) 說話者對補語子句中靜態動詞的延展長度的語用知識。

我們提供豐富的證據論證上述這些因素，再加上 Gennari 於 2003 年對靜態動詞所主張的超時段特性就可以很完善地說明漢語補語子句的時間解釋，我們對漢語補語子句的分析進一步支持了 Gennari 的時制理論，也對 Abusch 及 Ogiwara 的理論提出反證。

關鍵詞：時制、時態、時間指涉，補語子句，時制呼應

### Abstract

The main purpose of this project is to continue my study of tense and aspect in the past two years. I have studied the temporal semantics of *zhao*, *le* and *guo* and discussed the devices that the Chinese language uses to express temporal information in quite a detail. The results of my previous study are very fruitful. Many of them have already been published in journals such as *Language and Linguistics* 2000, *Lingua* 2002, *Linguistics* 2003, *Tsinghua Journal of Chinese Studies* 2003 and *Journal of East Asian Linguistics* 2003. Despite the depth of

my previous studies of tense and aspect, several major issues were not touched and I hope to explore those untouched issues in the two forthcoming years. In this study, I will first focus on the temporal interpretation of complement clauses in Chinese. In particular, I will study the so-called sequence of tense phenomenon, the backward shifted reading, the forward shifted reading, the simultaneous reading and the double access reading in Chinese. I propose that several factors conspire to determine the temporal interpretation of complement clauses in Chinese. They are:

- (i) aktionsart properties of the embedded clause,
- (ii) the distinction between the perfective and imperfective viewpoint aspect of the embedded clause,
- (iii) the presence/absence of an implicit anaphoric or overt temporal adverbial in the matrix or embedded clause,
- (iv) world or pragmatic knowledge of the typical duration of the embedded predicate

I argue that the above factors, plus Gennari's super-interval property of stative predicates, nicely account for the temporal interpretation of complement clauses in Chinese. My discussion shows that Gennari's analysis of embedded tenses has a better universal potential of a cross-linguistic explanation than Abusch's and Ogihra's theories.

## 二、緣由與目的

本計畫的緣由主要來自於我們前兩年有關漢語時間解釋的研究計畫，在前兩年的計畫裡，我們已經有系統地對影響漢語時間解釋的因素作了相當程度的研究，特別是有關核心句子(Bare Sentence)、時體助詞、副詞子句等的時間解釋作了非常深入的討論，但是對於補語子句的時間解釋，雖然也有著墨，但是多為描述性成分居多，缺乏形式分析的具體內涵，而且在語言事實的掌握上似乎也有所不足，因此在這次的計畫裡，我們希望能補足這方面的缺失，對於語言事實的真相，做進一步的釐清與確認，然後提出具體的理論分析，以便於日後作跨語言對比分析時，特別是與英語的比較，能有具體之理論根據及比較內涵。

## 三、結果與討論

此次的研究計畫我們大約已經完成了五分之四，已經進入論文撰寫階段，並已經寫出了約 33 頁論文，預估再一個月的時間即可完成一篇可供發表的論文，並向外投稿，因此整個研究計畫進度皆在原始預定中，可於七月底如期完成整個研究計畫。現在就已經完成的部分略做說明。我們在文章中的導論首先討論英文中補語子句的各種不同時制對時間解釋的影響，並介紹 Sequence of Tense (時制呼應) the backward shifted reading (時間后置解釋)，the forward shifted reading (時間前置解釋)，the simultaneous reading (時間重疊解釋) 及 the double access reading (時間雙指解釋) 等概念，接著探討漢語的補語子句的時間解釋，看看是否也具有和英語類似的現象，我們對於漢語補語子句的時間解釋的語言事實看法如

下：

- (1) 如同英語一樣，補語子句的時間重疊解釋和事件類型有密切關係，只有無自然終結點的靜態情狀及進行式情狀才有重疊義，有自然終結點的情狀只能得到時間後置解釋。
- (2) 時間前置解釋需在補語子句裡放上一個時間副詞或是語境中提供這樣一個副詞才行。
- (3) 時間副詞若出現於主要子句則只能獲得時間重疊解釋。
- (4) 補語字句若無表示未來的助動詞『會』或其他時間副詞，則得不到時間後置解釋。
- (5) 若無任何時間副詞或時體助詞出現，而補語子句是無自然終結點的情狀時，則可能產生時間雙指解釋。

接著在第二節裡，我們很仔細地評論介紹目前文獻上有關補補語子句時間解釋的主要理論，我們共介紹評論了下面幾位語言學家的理論：Muvet Enc (1987), Toshiyuki Ogiyama (1989, 1995, 1996), Abusch (1988, 1994, 1997) 及 Silvia Gennari (2003)，並且暗示 Gennari 的理論較有可能運用到漢語裡。

文章的第三節主要是介紹決定漢語時間解釋的方式及其實際操作模式。我們首先提出核心子句的時間解釋主要是依賴完整體與非完整體的區別來決定，完整體的句子會得到過去式意義而非完整體則是得到現在式的意義。帶有時態助詞及時間副詞的句子則是由時態助詞及時間副詞決定時間解釋，除了討論上述決定時間解釋的方式外，我們也討論了完整體和未來式之間的關係並提出漢語的完整體和未來式不相容

的概念及原因。

文章的第四節則是對第一節所討論的語言事實利用第三節所介紹的理論提供實際的分析，在這一節裡我們詳細地介紹了態度動詞的語意分析，並提出詳細的證據證明，漢語態度動詞補語子句的時間解釋除了和補語子句的動詞分類有密切的關係外，我們尚須利用 Gennari 所提的靜態動詞的超時段理論，透過補語子句動詞的語用因素來說明態度動詞補語子句的時間重疊及時間前置兩種時間解釋，我們這一節裡的討論結果很清楚的告訴我們在所有目前文獻中有關補語子句的時間解釋的理論裏，似乎 Gennari 的理論較有普遍性基礎，因為她的理論除了可用來解釋時制語言的時間解釋外也可用來解釋非時制語言的時間解釋。

文章的第五節計畫討論關係子句的時間解釋並與補語子句的時間解釋作比較，計畫於六月底完成。文章的第六節是結論部分，也預計在六月底完成。

#### 四、計畫成果自評

我們此次計畫的研究結果不僅釐清了許多前人不曾討論過的有關態度動詞補語子句的語言事實，在理論分析上也深入討論許多前人不曾討論過，卻對漢語補語子句時間解釋有非常大影響的因素，因而提升了我們對於漢語態度動詞補語子句的時間解釋的全盤性瞭解，這對於日後研究漢語補語子句的時間解釋的學者不僅有相當大的啟發作用，對於有興趣作不同語言的對比分析研究或是普遍語法研究的學者，也提供了非常有用的比較基礎。

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# The Temporal Interpretation of Embedded Clauses in Chinese and Its Implications for Theories of Embedded Tenses

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## 1. Introduction

Temporal interpretations of embedded tenses/clauses display some interesting properties. Consider the English sentence (1), where a past tense is embedded to another past tense.

- (1) John said that Mary was pregnant.
- (2) a. John said, “Mary is pregnant”.
  - b. John said, “Mary was pregnant”.
  - c. John said, “Mary will be pregnant”.

(1) has two distinct temporal readings. The time of the event described by the embedded clause *Mary was pregnant* may be simultaneous with or prior to the time of the matrix event time. The first reading is equivalent to what (2a) expresses and is sometimes called the simultaneous interpretation. This reading seems to be derived by converting the present tense of the direct quotation into the past tense in the indirect quotation and is known as the sequence of tense phenomenon in the literature. The simultaneous reading is often claimed to be possible only with embedded stative predicates (Enç 1987, Ogihara 1989, Stowell 1993, Gennari 2003).<sup>1</sup> The second reading is equivalent to what (2b) says and is often referred to as the backward shifted reading. However, (1) does not have a reading on which the embedded event time follows the matrix event time. That is, (1) cannot be equivalent to what (2c) says. This impossible reading is sometimes referred to as the forward shifted reading.

On the other hand, if a present tense is embedded to a past tense, the event time of the embedded clause has to coincide not only with the matrix event time but with the speech time. This is illustrated in (3).

- (3) John said that Mary is pregnant.

Such a reading is referred to as the double access reading in the literature.

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<sup>1</sup> However, see Kiyomi Kusumoto (1999) for some counterexamples, which have a clear restriction on them.

In the above examples, we have a complement clause embedded to an attitude report verb. It has been pointed out that tense in relative clauses behave differently from tense in complement clauses. According to Ogihara (1989, 1996), just like the past tense in a complement clause, the past tense of a relative clause can be understood as simultaneous with a higher dominating tense, displaying a sequence of tense phenomenon. This is illustrated by (4), where the time of the fish being alive can be understood as simultaneous with a future buying time.

(4) John said that he would buy a fish that was alive.

However, Enç (1987), Abusch (1988, 1994, 1997), and Ogihara (1989, 1996) also have observed that tense in relative clauses differs from tense in complement clauses in some ways. First, unlike tense in complement clause, tense in relative clauses can have a forward shifted reading. For example, in (5), the woman could win the Noble Prize after she married with John.

(5) John married a woman who became a Noble Prize winner.

Second, when a present tense is embedded in a relative clause under a past tense as in (6), there is no effect of obligatory double access. The embedded event in (6) only needs to be co-temporal with the speech time.

(6) John talked to a woman who is crying.

Examples like those in (1)-(6) have raised very interesting questions concerning temporal interpretations of embedded contexts. How do the different interpretations of tenses in embedded clauses arise? Are English morphological tenses ambiguous or do they have a uniform meaning across contexts? Different authors have provided different answers to these questions. I will review those analyses later.

As we saw above, English resorts to different tense morphology to express the simultaneous reading, the backward shifted reading and the double access reading. As is well known, Chinese lacks inflectional morphology to indicate tenses. It is therefore very interesting to see what kind of temporal interpretations Chinese embedded clauses may get and how they are determined.

To begin with, consider the sentences in (7).

(7) a. Yuehan shuo Mali hen piaoliang  
John say Mary very beautiful



‘John said that Mary is beautiful.’

b. Huiying shuo ta hen jinzhang/mang

Huiying say she very nervous/busy

(i) ‘Huiying said that she was nervous/busy.’

(ii) Huiying said that she is nervous/busy.’

In both (7a) and (7b), the matrix and embedded clauses do not contain any temporal adverb or aspectual marker. The embedded predicate in (7a) is an individual-level predicate, whereas the embedded predicate in (7b) is a stage-level predicate. The most natural interpretation of (7a) is that the embedded predicate is true of the saying time as well as the speech time. This should be the case, because individual-level properties do not change over time easily. Next consider (7b). Uttered out of the blue, (7b) doesn’t seem to have the backward shifted interpretation, unless the context of utterance has a pre-established reference time for the embedded clause as in (8a) or an overt temporal adverbial is inserted to the embedded clause as in (8b).

(8) a. Speaker A: Ni zhidao Yuehan qiantian kaoshi  
you know John the-day-before-yesterday exam  
de qingxing ma?  
DE situation Q

‘Do you know how John’s test the day before yesterday was?’

Speaker B: Yuehan shuo ta hen jinzhang

John say he very nervous

‘John said that he was nervous.’

b. Huiying shuo Xiujia zuotian hen mang

Huiying say Xiujia yesterday very busy

‘Huiying said that Xiujia was very busy yesterday.’

The situation here is much like the “out of the blue” interpretations of statives and perfects in English. Sandstrøm (1993) and Katz (2004) have noted that statives and perfects are associated with some presuppositions that are not evident with simple eventives. They point out that out of the blue perfects and statives such as (9a) and (9b) are infelicitous, because the hearers/readers are left to wonder what time is being talked about much as when a definite NP or pronoun is used at the start of a text.

(9) a. John had eaten all of the toast.

b. The bread was on the shelf near the door.

However, if these sentences have a pre-established time to anchor them as in (10), they are

grammatical.

- (10) a. Mary walked into the kitchen. John had eaten all of the toast.  
b. Mary walked into a store. The bread was on a shelf near the door.

The (past) simultaneous interpretation seems quite similar. This reading needs support of a pre-established reference time or an overt temporal adverbial. What is different is that in this case the pre-established reference time or the temporal adverbial is part of the matrix clause rather than the embedded clause. This is illustrated by (11).

- (11) Ganggang zai dengdai miantan deshihou Yuehan shuo ta hen  
just-now Prog wait-for interview while John say he very  
jinzhang  
nervous  
'While John was waiting for the interview a moment ago, he said he was very nervous.'

A situation where (11) is true is this: While John was waiting for the interview, he said, "I am very nervous". But after the interview, he is no longer nervous at the speech time. In this scenario, the embedded complement has only the simultaneous reading, but not the double access reading. It is worth noting that in (12) though the temporal adverbial is placed at the matrix clause, it is interpreted as if it were in the embedded clause. Thus, (11) is interpreted as almost equivalent to: John said that he was nervous just now at the waiting interval.

The only reading of (7b) that does not need a pre-established reference time or an overt temporal adverbial is the double access reading. For example, (12) can be uttered out of the blue to initiate a discourse and obtain the double access reading.

- (12) Yuehan shuo ta hen mang, jiao women bu yao chao ta  
Yuehan say he very busy ask us not want bother him  
'John said that he is busy and asked us not to bother him.'

Whether or not the truth interval of the state complement overlaps with the speech seems to also depend upon how far the attitude time is away from the speech time. The farther it is away from the speech time, the less likely it is for the truth interval of the state complement to overlap with the speech time. For example, (12) implies that the saying/attitude time is relatively close to the speech time, say, John might say the words "I am busy" just a few minutes or hours ago. When the saying/attitude time is close to the speech time, no overt temporal adverbial seems to be needed. In contrast, if John's saying/attitude time is three or more days ago, it will be less likely that the state complement will still hold true at the speech

time, though this possibility is not absolutely excluded. Such cases usually require an overt temporal adverbial to make the temporal location clear as in (13), unless the reference time is already pre-established.

- (13) Yuehan san tien qian shuo ta hen mang, jiao wo bu yao  
Yuehan three day ago say he very busy ask me not want  
chao ta  
bother him  
'John said three days ago that he was busy and asked me not to bother him.'

Still another factor that may determine whether or not the truth interval of the state complement overlaps with the speech time is the nature of the stative predicates. Stage-level predicates which denote longer event duration are more likely to overlap with the speech time. For instance, (14) implies that the truth interval of the state complement overlaps with the speech time even though the subject's saying time is relatively far away from the speech time.

- (14) Lisi san tian qian gen wo shuo Mali yinwei shenti bu hao  
Lisi three day ago to me say Mary because body not good  
hen tongku  
very painful  
'Lisi told me three days ago that Mary is very painful because of her bad health.'

Normally, bad health lasts for a period of time and is not very likely to change within three days. Therefore, (14) tends to imply that the truth interval of the state complement overlaps with the speech time, though this interpretation is not absolutely forced.

The above discussion indicates that whether or not the truth interval of the state complement overlaps with the speech time depends largely on people's knowledge of the properties of the embedded stative predicate as well as the distance between the attitude time and the speech time. This suggests that the probability of the double access reading in Chinese can be thought of as a kind of (non-absolute) scale, the extreme case being the individual-level predicates, which denote more or less permanent properties not changing with time. If this is correct, the double access reading in Chinese is more of pragmatic nature rather than being grammatically encoded.

It is also interesting to note that the double access reading can be made most salient by the use of the progressive (or spatial prepositional) marker *zai*. When (10) is uttered out of the blue, it has a very strong implication that *Xiujia* is angry at the speech time and the Mother's saying time is quite close to the speech time.

- (15) Mama shuo Xiujia zai shengqi

mother say Xiujia Prog angry  
'Mother said that Xiujia is angry.'

However, the progressive marker *zai* in (15) cannot be analyzed as an equivalent to a present tense marker. When a temporal adverbial is inserted to the matrix clause in (15), the implication that the embedded clause holds true at the speech time will no longer hold. This is illustrated by (16). The eventuality denoted by the embedded clause might still be true at the speech time but that is not what is asserted. What is asserted is that at the time of *Huiying's* saying, *Xiujia* is angry. That is, (16) has the simultaneous reading rather than the double access reading.

(16) Huiying ganggang shuo Xiujia zai shengqi  
Huiying just-now say Xiujia zai angry  
'Huiying said that Xiujia is being angry.'

(16) thus clearly indicates that the progressive marker *zai* should not be analyzed as an absolute equivalent to English present tense marker.

The context of utterance can also override the double access reading of (15) by providing a temporal adverbial in the embedded clause or through a frame time set up by the previous discourse.

(17) Mama shuo Xiujia ganggang zai shengqi  
mother say Xiujia just-now zai angry  
'Mother said that Xiujia was angry just now.'

In (17), the event time of the embedded clause is only asserted to be true at the interval specified by the temporal adverbial *ganggang* 'just now'. *Xiujia* might still be angry at the speech time but that's not what is asserted by the sentence. The sentence only asserts that *Xiujia* was angry at the interval specified by *gangcai* 'just now', which is earlier than the saying time. This is in contrast to (15), where *Xiujia* is asserted to be angry at the speech time.

To summarize, when the embedded predicate of a complement clause is a stage-level predicate or a progressive predicate, the out of the blue reading seems to be the double access reading. This reading is particularly striking for the progressive predicate. To obtain the backward shifted and the simultaneous reading, a pre-established reference time or an overt temporal adverbial is needed. The backward shifted reading requires that the understood reference time or the overt temporal adverbial modifies the embedded clause, whereas the simultaneous reading requires that the understood reference time or the overt temporal adverbial modifies the matrix clause.

The use of aspectual markers such as the sentence-final particle *le* or the experiential

marker *guo* also influences the temporal location of an embedded event. This is illustrated by (18) and (19).

(18) Yuehan shuo Mali shengqi le  
Yuehan say Mary angry Asp  
'John said that Mary is angry.'

(19) Yuehan shuo Mali sheng-guo qi  
John say Mary get-Asp angry  
'John said that Mary was angry before.'

The use of the sentence-final *le* in (18) causes the state of being angry to overlap the matrix event time as well as the speech time, i.e., the double access reading, whereas the use of *guo* in (19) forces the state of being angry to cease to exist at the time of saying, i.e., the backward shifted reading. In this article, I will not discuss the semantics of the above aspectual markers. The readers are referred to Lin (2003) for a detailed discussion of these markers.

The final point about temporal interpretations of complement clauses is that a complement clause may be ambiguous only when it describes a state. When the embedded clause denotes an event, only the backward shifted reading is possible. This patterns with the English data.

(20) Yuehan shuo Mali dapuo huaping  
John say Mary break vase  
'John said that he broke a vase.'

As for temporal interpretations of relative clauses, Chinese data seem to also display some properties similar to those we have seen for English relative clauses, though there is no overt tense morphology in Chinese. For example, like the past tense in English relative clauses, the temporal interpretation of a Chinese relative clause can be simultaneous with that of a higher clause, as is shown by (21), where the time of being alive is co-temporal with the time of buying.

(21) Yuehan shuo ta hui mai yi tiao huo de yu  
John say he will buy one Cl alive Rel fish  
'John said that he would buy a fish that was alive.'

Also like English relative clauses, Chinese relative clauses may allow the forward shifted reading, in addition to the backward shifted reading as in (22). That is, the time of the journalist's writing that article can be after the time of hiring him.

(22) Shi shei guyong-(le) na-wei xie zhe-pian wenzhang de jizhe?  
 be who hire-Asp that-Cl write this-Cl article Rel journalist  
 ‘Who hired the journalist who wrote that article?’

In Chinese, we can also find examples where the relative clause is understood as being true at the speech time without it also being true at the past matrix event time.

(23) Wo jian-guo na-wei zai ku de nanhai  
 I mee-Asp that-Cl Prog cry Rel boy  
 ‘I met that boy who is crying.’

Interestingly, however, if the demonstrative *na* is replaced with the numeral *yi* ‘one’, the relative clause must be understood as denoting a past event which is simultaneous with the time of the matrix event, as is illustrated in (29).

(24) Wo jian-guo yi-wei zai ku de nanhai  
 I meet-Asp one-Cl prog cry Rel boy  
 ‘I met a boy who was crying.’

Above I have briefly reviewed some interesting facts about temporal interpretations in embedded contexts in English and Chinese. I have shown that though Chinese does not have overt morphological tenses, it displays some phenomena similar to what is discussed for English embedded clauses, though they are not exactly alike. In this paper, I will try to provide an account for the Chinese facts, at the same time making a cross-linguistic comparison between English and Chinese. In particular, I will discuss what implications the Chinese facts have made for the different theories of embedded tenses that have been proposed in the literature. This article is organized as follows. In section 2, I will summarize previous approaches to embedded tenses in English. In section 3, I will discuss some basic factors that determine the temporal interpretations of Chinese sentences.

## 2. Previous Analyses of English Data

### 2.1 Enç’s (1987) account

The sequence of tense phenomenon raises a very interesting question as to what tenses in English mean. As is well-known, matrix tenses in English are deictic. Thus, the past tense is interpreted as past relative to the speech time and the present tense is interpreted as simultaneous with the speech time. If tenses in embedded contexts are also interpreted as relative to the speech time, we will have a uniform absolute tense theory. On this absolute

tense theory, both the matrix and the embedded tense are independently interpreted relative to the speech time. For example, in (1), the matrix tense is a past tense, so the event time of saying is before the speech time. Similarly, the embedded past tense requires that the event time of Mary's being angry precede the speech time. Since there is no ordering restriction between the matrix and the past tense, the event time of the embedded clause may precede or be simultaneous with the event time of the matrix clause. Thus, the absolute tense theory successfully accounts for the ambiguity of examples like (1). However, one problem with this theory is that if an embedded past tense may denote any past time, this predicts that the past tense in the embedded clause in (1) may denote a time later than the matrix event time of saying. However, this reading is unattested.

Enç (1987) has proposed a variant of the absolute tense theory which avoids the above-mentioned problem by stating some clear constraints on the potential denotations of tenses. Based upon Partee's (1973) referential theory of tense, she suggests that the denotation of tenses, present or past, is defined through their relation with some Complementizer position.

- (25) a. Where A is a past tense, B is a Comp with a temporal index, and B is a local Comp of A,  $[[A]] < [[B]]$ .  
 b. Where A is a present tense, B is a Comp with a temporal index, and B is a local Comp of A,  $[[A]] = [[\beta]]$ .  
 c. A Comp  $\beta$  is a local Comp of a tense  $\alpha$  iff  $\beta$  governs  $\alpha$  or  $\beta$  governs a tense  $\gamma$  and  $\gamma$  binds  $\alpha$ . [Ogihra's (1996) paraphrasing of Enç (1987), pp. 86-87]

In addition, Enç proposes the following conditions to regulate tenses and Comp:

- (26) Each tense must be anchored.  
 (27) A tense must carry a temporal index, whereas a Comp optionally carries one.  
 (28) a. Tense is anchored if it is bound in its governing category, or if its local Comp is anchored. Otherwise, it is unanchored.  
 b. If Comp has a governing category, it is anchored if and only if it is bound within its governing category.  
 c. If Comp does not have a governing category, it is anchored if and only if it denotes the speech time.

According to Enç, the above assumptions will produce two possible tense anchorings for examples like (1), as is shown in (29). These two indexed structures result in two distinct readings.

- (29) a.  $[[C_0]_{IP} \text{ John Past}_1 \text{ say } [[C_P \text{ that } [IP \text{ Mary Past}_1 \text{ be pregnant}]]]]$

b. [[C<sub>0</sub>]<sub>IP</sub> John Past<sub>1</sub> say [[C<sub>P</sub> that<sub>1</sub> [<sub>IP</sub> Mary Past<sub>2</sub> be pregnant]]]]

In (29a) the embedded past tense is governed by the embedded Comp.<sup>2</sup> Therefore its governing category is the matrix IP. Since it is bound in the governing category, it is anchored. In contrast, the matrix past tense is not bound, because there is no IP or NP that contains the matrix past tense and the matrix Comp. Thus, the local Comp of the matrix past tense must be anchored. Since the matrix Comp is not governed, it does not have a governing category. Consequently, the matrix Comp must denote the speech time in order to be anchored. It follows that both the matrix and embedded past tenses must denote an interval earlier than the speech time—in fact, the same interval due to the coindexing, because the matrix Comp is the local Comp of both. This accounts for the simultaneous interpretation of (1).

In (29b) the matrix past tense is anchored just like the case in (29a). The complement tense is not bound in its governing category. Therefore, its local Comp, i.e., the embedded Comp must be anchored. The embedded Comp is anchored iff it is bound within its governing category, which is the matrix clause. This is the case. Therefore the embedded tense is anchored. According to (20a), the complement tense in (29b) must then denote an interval earlier than the interval denoted by the embedded Comp. Since the embedded Comp is coindexed with the matrix past, it follows that the embedded past must precede the matrix past. This accounts for the backward-shifted reading of (1).

Enç argues that her theory also explains why a past tense in a relative clause allows three readings rather than just two. According to her, the temporal difference between a complement and a relative clause is a pure structural matter. When the embedded tense in a relative clause is bound in its governing category, we will get a simultaneous reading just like the case in a complement clause. However, if the embedded tense is not bound, the situation is different. In a complement clause, the embedded Comp always has a governor, i.e., the matrix verb, hence a governing category, whereas the embedded comp in a relative clause has no governor. Therefore, if the tense in a relative clause is not bound, the embedded Comp must denote the speech time in order for the embedded Comp and tense to be anchored. When the embedded Comp is anchored by denoting the speech time, the embedded tense is an absolute tense. Therefore, there is no order restriction between the tense of the matrix clause and the tense of the relative clause, yielding the backward-shifted and forward-shifted readings.

Despite Enç's endeavor to show that the English past tense is unambiguous—it always expresses anteriority, her analysis has both a theoretical and empirical problem. The theoretical problems is that it is more difficult to translate her approach to a more compositional semantics (Kusumoto 1999). The empirical problem, pointed out by Abusch (1988) and Ogihra (1989, 1995, 1996) is that when we have more embedded clauses rather

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<sup>2</sup> According to Enç, when A governs a maximal projection B, A also governs the head of B.



than just one as in the sentence *John decided a week ago that in ten days he would say to his mother that they were having their last meal*, there is a reading according to which what John decided to say to his mother is something like ‘We are having our last meal together’. However, this reading cannot be derived in Enç’s theory. This reading requires the following indexed structure:

(30) [[C<sub>0</sub>]<sub>IP</sub> John Past<sub>1</sub> decide a week ago [C<sub>P</sub> that<sub>1</sub> in ten days at breakfast he would<sub>2</sub> say to his mother [C<sub>P</sub> that they Past<sub>2</sub> be having their last meal together]]]

As noted, according to Enç, the local Comp of a binder is also a local Comp of a bindee. In (30), the local Comp of *would*<sub>2</sub> in the intermediate clause is the intermediate Comp. Since *would*<sub>2</sub> binds the lowest past tense, the local Comp of *would*<sub>2</sub> is also a local Comp of the lowest clause. *Would*<sub>2</sub> must denote a time later than the time of deciding as is required by the temporal adverbials. This, however, contradicts the requirement that the time denoted by the lowest past tense must precede the time of the intermediate Comp, which is also the time of deciding due to coindexing. Ogihara (1996) shows that to correct this problem, some rule like Sequence of Tense, as will be discussed later, must be adopted, and thus the meaning of past tense cannot be unambiguous as Enç has tried to show.

Another problem with Enç’s referential theory of tense, as pointed out by Ogihara (1989, 1996), Abusch (1997a), Heim (1994), von Stechow (1995a,b), Kratzer (1998), and Kusumoto (1999) is that on the simultaneous interpretation one can find a context in which the sentence is true but the matrix event time and the embedded event time do not coincide in the actual world, contradictory to what Enç’s theory predicts. Here is one such context for sentences like (1) quoted from Kusumoto (1999).

Suppose that Josephine was pregnant on December 1998, and expected to give birth to her baby on January 6<sup>th</sup>, 1999. On the morning of December 31<sup>st</sup>, Gordon and Josephine were involved in a car accident. Josephine and her baby were not injured, but Gordon was and was carried to a hospital. He was in a coma. Four months later at 11:00AM, on May 1<sup>st</sup>, Gordon suddenly woke up and remembered everything including the accident, up to his losing consciousness. He was worried about his wife and said, “Where’s Josephine? She is pregnant.”

(Kusumoto 1999: 62)

In this context, one can report what Gordon said with the sentence *Gordon said Josephine was pregnant*. This indicates that people normally do not know what time they are located at (and what world they are located in). They only know what time (and what world) are compatible with what they believe in a given world. In other words, a sentence embedded

under a propositional attitude verb cannot denote just a proposition, i.e., a set of worlds, but also properties of time. Enç's analysis certainly does not capture this.

## 2.2 Ogihara (1989, 1995, 1996)

The above-discussed problems with Enç have led many researchers to think that embedded past tenses are different from matrix past tenses in that they can be semantically vacuous (Ogihara 1989, 1995, 1996; Stowell 1993, 1996; Abusch 1994, 1997a; Heim 1994; von Stechow 1995a,b; Kratzer 1998). These authors all agree that the embedded clauses of propositional attitude verbs denote properties of times, which necessarily yields the simultaneous interpretation when combined with a proper analysis of attitude verbs. I will here summarize Ogihara's and Abusch's theories.

Ogihara (1989, 1995, 1996) has proposed the Sequence of Tense rule (The SOT rule), which says that if a tense, be it present or past, is locally c-commanded by another tense of the same feature at LF, it can be optionally deleted. Thus, examples like (1) have two LFs, depending on whether or not the SOT rule has applied.

- (31) a. [John Past say [Mary  $\emptyset$  be present]]  
       a'  $\exists t[t < s^* \ \& \ \text{say}'(t, j, \wedge \lambda t \lambda x[\text{be-pregnant}'(t, m)])]$   
       b. [John Past say [Mary Past be pregnant]]  
       b'  $\exists t[t < s^* \ \& \ \text{say}'(t, j, \wedge \lambda t_2 \lambda x \exists t_1[t_1 < t_2 \ \& \ \text{be-pregnant}'(t_1, m)])]$

If the SOT rule has applied as in (31a), the simultaneous interpretation (31a') is obtained. If it doesn't, the backward-shifted interpretation (31b') is yielded. To see exactly how the two readings are derived, we need to know the semantics of attitude verbs. Adopting Lewis's (1979) idea that belief report is to self-ascribe some property that involves worlds and times as well as individuals, Ogihara posits the following lexical meanings for the verbs *believe* and *say*.

- (32) a. For any world  $w_0$ , property  $P_0$  in  $D_{\langle s, \langle i, \langle e, t \rangle \rangle \rangle}$ , individual  $a_0$ , an interval  $t_0$ ,  
       [[believe']] $_{w_0}(P_0)(a_0)(t_0)$  is true if and only if at  $\langle w_0, t_0 \rangle$   $a_0$  self-ascribes the property  $P_0$ .  
       That is, every doxastic alternative  $\langle w', t', x' \rangle$  of  $a_0$  in  $w_0$  at  $t_0$  is an element of  
        $\{ \langle w'', t'', x'' \rangle \mid P_0(w'')(t'')(x'') = 1 \}$   
       b. For any world  $w_0$ , property  $P_0$  in  $D_{\langle s, \langle i, \langle e, t \rangle \rangle \rangle}$ , individual  $a_0$ , an interval  $t_0$ ,  
       [[say']] $_{w_0}(P_0)(a_0)(t_0)$  is true if and only if at  $\langle w_0, t_0 \rangle$   $a_0$  talks as if  $a_0$  self-ascribes the property  $P_0$ . That is,  $a_0$  talks in  $w_0$  at  $t_0$  as if every doxastic alternative  $\langle w', t', x' \rangle$  of  $a_0$  in  $w_0$  at  $t_0$  is an element of  $\{ \langle w'', t'', x'' \rangle \mid P_0(w'')(t'')(x'') = 1 \}$   
       c.  $\langle w', t', x' \rangle$  is a doxastic alternative of  $\langle w, t, x \rangle$  iff  $\langle w', t', x' \rangle$  satisfies every property  $x$  self-ascribes in  $w$  at  $t$ . (Ogihara 1996: 117, 120)

On the above assumptions (31a') is true iff there is a past time  $t_0$  in the actual world  $w_0$  such that John talks in  $w_0$  at  $t_0$  as if he self-ascribes the property of being in a world  $w'$  where Mary is present at a time  $t'$ . Note that in (31') there is no direct temporal relation that links the embedded clause to the matrix clause. However, according to Ogihara (1996: 120), if the property John self ascribes in  $w_0$  and  $t_0$  happens to be about  $w_0$  and  $t_0$ , it follows that the time of saying is also the time of Mary's being pregnant. In other words, the simultaneous reading is derived via the truth conditions of the sentence rather than coindexing.

On the other hand, in (31b'), if John happens to have in  $w_0$  at  $t_0$  the property he self ascribes in  $w_0$  at  $t_0$ , then it must be the case that there is a time  $t_1$  earlier than  $t_0$  such that Mary is pregnant at  $t_1$ . So the backward-shifted interpretation is derived from the fact that the embedded Past is interpreted relative to the believer's attitude time  $t_0$ .

As for the double access reading, Ogihara (1995, 1996) has proposed an event-based *de re* account for it. He suggests that events and states have different properties with respect to their associated existence predicates, which he defines as follows, where Duration ( $\alpha$ ) is the maximal interval that  $\alpha$  occupies:

- (33) a.  $[[\text{exist}'_{st}]]_{w,g}$  (for any  $w$  and  $g$ ) is that function from  $S$  to  $\{f \mid f \text{ is a function from } T \text{ to } \{0,1\}\}$  such that for any  $s \in S$  and  $t \in T$ ,  $[[\text{exist}'_{st}]]_{w,g}(s)(t) = 1$  if and only if  $t \subseteq \text{Duration}(s)$ .
- b.  $[[\text{exist}'_{ev}]]_{w,g}$  (for any  $w$  and  $g$ ) is that function from  $E$  to  $\{f \mid f \text{ is a function from } T \text{ to } \{0,1\}\}$  such that for any  $e \in E$  and  $t \in T$ ,  $[[\text{exist}'_{ev}]]_{w,g}(e)(t) = 1$  if and only if  $\text{Duration}(e) = t$ .  
(Ogihara 1995: 201)

Past tense and present tense are defined as in (33).

- (34) a.  $\text{Past}_1 = \lambda P_{ev} \exists t [\exists e [t < s^* \ \& \ \text{exist}'(t,e) \ \& \ P_{ev}(e)]]$   
b.  $\text{Present} = \lambda P_{st} \exists s [\text{exist}'(s^*, s) \ \& \ P_{st}(s)]$  Ogihara 1995: 201, 202

With the above assumptions, Ogihara proposes that a double access sentence such as (35a) has the logical form (35b), which is derived by moving the embedded present tense to the matrix clause, yielding a *de re* configuration. He also assumes that when a tense moves, it leaves behind a variable of the lowest type. This, together with a lexical meaning of *de re* attitude about states as given in (36a), gives (35b) the meaning of (36b).

- (35) a. John said that Mary is in the room.  
b.  $[_S \text{Pres}_2 [_S \text{Past}_0 [_S \text{John } e_0 \text{ say that } [_S s_2 [_S \text{Mary } s_1 \text{ be in the room}]]]]]$

- (36) a. For any  $w_0 \in W$ ,  $P_0 \in D_{\langle s, \langle i, \langle st, t \rangle \rangle \rangle}$ ,  $s_0 \in S$ ,  $a_0 \in A$ , and  $e_0 \in E$ ,  $[[\text{say}']]_{w_0}(P_0)(s_0)(a_0)(e_0) = 1$  (which informally reads, ‘In  $w_0$ ,  $a_0$  talks at the duration of  $e_0$  as if  $a_0$  ascribes the property  $P_0$  to  $s_0$ ’) iff there is a “suitable relation”  $SR \in D_{\langle s, \langle i, \langle st, \langle e, t \rangle \rangle \rangle \rangle}$  such that (i)  $s_0$  is the state to which  $a_0$  bears SR in  $w_0$  at Duration ( $e_0$ ), and (ii)  $a_0$  talks in  $w_0$  at Duration ( $e_0$ ) as if for every doxastic alternative  $\langle w, t, x \rangle$  of  $a_0$  in  $w_0$  in  $w_0$  at Duration ( $e_0$ ), the state to which  $x$  bears SR in  $w$  at  $t$  has the property  $P_0$  in  $w$  at  $t$ .
- b.  $\exists s[\text{Exist}'(s^*, s) \ \& \ \exists e[e < s^* \ \& \ \text{say}'(e, j, s, \ ^\wedge \lambda t \lambda s_1[\text{be-in-the-room}'(s_1, m)])]]$   
(Ogihara 1995: 204-205)

According to the definition in (36a), what (36b) says is this: there exists a state  $s$  that John bears an acquaintance relation in  $w_0$  at the attitude time such that he talks in the past as if he self-ascribes to the state the property of being a state of Mary’s being in the room. This truth conditions explain the double access reading, because the state that the subject was acquainted with at the attitude time is the same state that obtains at the speech time.

### 2.3 Abusch’s (1991, 1993, 1997) Analysis

In this section, I will summarize Abusch’s (1991, 1993, 1997) analysis of sequence of tense and double access phenomenon. Very often, I will use von Stechow’s (1995) reinterpretation of Abusch’s analysis. Abusch, following Partee (1973), has treated tenses as variables denoting times. However, the behaviors of tenses in extensional and intensional contexts are different. In extensional contexts, the interpretations of tenses are standard: past tense (PAST) denotes a time that is before the utterance time and present tense (PRES) denotes a time not before the utterance time. However, in intensional contexts, tenses are bound by a lambda operator within the embedded clause. In this framework, both PAST and PRES are just variables whose interpretations are assigned by variable assignments. Their different interpretations arise as a result of a set of constraints, which can be thought of as presuppositions filtering on the variable assignments. What are the relevant constraints (presuppositions) for the PAST and PRES variables? First, we have a relation variable  $R$  ranging over the two temporal relations  $<$  and  $\neg<$ . This relation constrains the temporal relation between the time denoted by the tense variable and the utterance time and is called **reference constraint**, written formally as  $R(t, t_0)$ , where  $t$  stands for the time denoted by tense variables and  $t_0$  the local evaluation time.  $R$  specifies which relation of  $<$  and  $\neg<$  it belongs to, depending upon the **Tense Constraints**, to be defined below. There is also a store, called **Relations** and written as  $\{ \}$ , which contains the relation variables of the relevant tense. If a given tense is in an intensional context, it will also contain relation variables inherited from higher tense nodes that c-command it. The Tense Constraints, which are imposed on a set of relation variables, are defined in terms of the store and the relation variables as follows:

### Tense Constraints

PAST-constraint: At least one variable in the store equals the precedence relation  $<$ .

PRES-constraint: No variable in the store is identical to the precedence relation.

Finally, Abusch also proposes the constraint Upper Limit Constraint (ULC):

### Upper Limit Constraint<sup>3</sup>:

“the now of an epistemic alternative is an upper limit for the reference of tenses.[...]the local evaluation time is an upper limit for the reference of tenses.”

(Abusch 1995: 24)

All together, the above constraints constrain the reference of a tense variable. Take (37) as an illustration. (37a) has the LF (37b).

(37) a. Mary PRES1 is pregnant.

b.  $be\text{-pregnant}(t_1; R^{be}(t_1, t_0) \wedge R^{be} = \neg < \wedge \neg t_1 > t_0)(Mary)(w_0)$

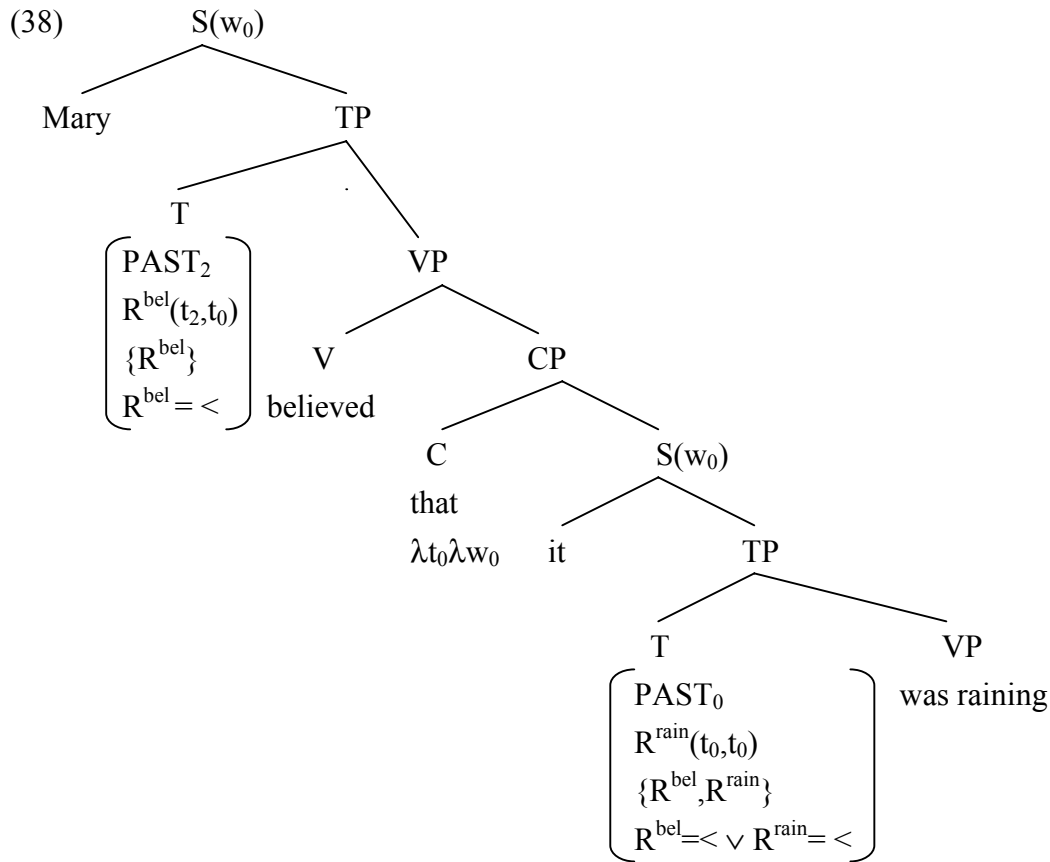
(von Stechow 1995: 12)

In (37b), the formulae after the semicolon represent the presuppositions (constraints) of the tense variables  $t_1$ . The LF in (37b) amounts to saying that (37a) is true if Mary is pregnant in the actual world  $w_0$  at time  $g(t_1)$ , where  $g(t_1)$  overlaps the speech time, which is entailed by the tense constraints and the upper limit constraint.

The most important feature of Abusch’s account for tenses in intensional contexts is the feature transmission mechanism, which transmits the relation of a tense node for an intensional predicate to the tense node of the intensional argument. For example, the LF of the sentence *Mary believed that it was raining* looks like the following:

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<sup>3</sup> This constraint of Abusch is replaced by von Stechow with ULC for res-time. I will come back to this.



Abusch has assumed that intensional arguments are interpreted by lambda-abstracting the believer's now. To evaluate the LF (38), a semantics of propositional attitude such as (39) is postulated.

**(39) Semantics for de dicto belief<sup>4</sup>**

*believe* is a symbol of type  $\langle\langle i, st \rangle, \langle i, \langle e, st \rangle \rangle\rangle$ .

$\|believe\|^{g,c} (P)(t)(x)(w)$  冻1 iff for every world  $w'$  and time  $t'$  not ruled out by what  $g(x)$  believes in  $g(w)$  at  $g(t)$ ,  $P(t')(w')$  冻1.

Now consider first the presuppositions of the higher tense node in (38). These presuppositions imply that  $g_c(t_2) < g_c(t_0)$ , i.e., the denotation of  $t_2$  is before the speech time. Next consider the presuppositions of the embedded clause. These presuppositions imply that  $g_c(R^{rain}) \neq <$  due to the reference constraint  $R^{rain}(t_0, t_0)$ . However, the tense constraint imposed by the embedded past tense can still be satisfied by the tense relation inherited from the higher tense node, as the PAST-constraint is disjunctive. Since the embedded tense is bound by the believer's now,

<sup>4</sup> A *de dicto* belief is a belief of a proposition to be true. This is in contrast to a *de re* belief, which is a belief about an object, the *res*, that it is so and so.

i.e.,  $\lambda_0$ , the truth conditions of (38) are this: For every world  $w$  and every time  $t$  that are compatible with what Mary believes at  $g_c(t_2)$  in the actual world  $w_0$ , it is raining at  $t$  in  $w$ . This gives us the simultaneous reading.

What about the double access reading seen in sentences like *John thought that Mary is pregnant*? On Abusch’s system, the tense constraint for PRES in the embedded clause prohibits a present tense from being bound in the subordinate clause as in the following LF:

(40) \*John PAST<sub>1</sub> thought  $\lambda_0$ [that Mary PRES<sub>0</sub> is pregnant]

In (40), PRES<sub>0</sub> inherits the precedence relation from PAST<sub>1</sub>, but this violates the PRES tense constraint, which says that the store of a present tense does not contain any precedence relation. To avoid this problem, a temporal *de re* analysis of belief is proposed. (See Cresswell & von Stechow 1982 for *de re* belief.) That is, the embedded PRES<sub>0</sub> must move out of the intensional domain to an extensional position, i.e., the *res* position, so that it is no longer subject to the inheritance mechanism. After the embedded tense is moved out of the intensional domain, its local evaluation time will be the speech time rather than the believer’s now. This is shown in (41).

(41) John PAST<sub>1</sub> thought PRES<sub>2</sub>  $\lambda_2\lambda_0$ [that Mary  $t_2$  is pregnant]

Although Abusch’s (1997) explanation of the double access reading is a little bit more complicated than what I will be presenting, roughly the analysis goes like the following, disregarding the formal details of the lexical semantics of *de re* belief. The denotation of PRES<sub>2</sub>—the *res*, must overlap the speech time. This produces two possibilities. It might or might not overlap the believing time. On the other hand, the trace left by the *res* is “bare of temporal properties” and hence there is no specification between its denotation and the local evaluation time, i.e., the believer’s now. However, as a tense node, it is still subject to the upper limit constraint. Consequently, the denotation of the trace can only overlap or precede the believer’s now but not later than it. We thus get four combinations of the reference of the *res* and its trace. However, the counterpart relation between the *res* and its trace requires that the actual and belief worlds be “temporally isomorphic”. This eliminates three of the four combinations. The remaining possibility is the one where the denotation of the *res* overlaps the believing time and the speech time. This explains the double access reading.

Abusch’s analysis of “backward shifted” interpretation may receive a *de re* analysis or a *de se* analysis. In a sentence like *John thought it was raining*, when the reference of the *res*, determined by the acquaintance relation, is an interval before the believing time, the “backward shifted” reading is derived. On the other hand, in a sentence like *Sue expects/expected to marry a man she loved*, the time of loving can be earlier than the time of marrying on a *de se* analysis.

Finally, recall that a sentence like *John believed that Mary was pregnant* does not have a “forward-shifted” reading, i.e., the time of pregnancy is later than the time of believing. Abusch accounts for this in terms of the Upper Limit Constraint (ULC) introduced above. However, von Stechow argues that if a *de re* belief is allowed, the forward shifted interpretation of the sentence *John believed that Bill was asleep* will not be explained. The *res* position is an extensional position, so its local evaluation time is the speech time. It follows from the ULC that the *res* cannot denote a time later than the speech time. However, this cannot exclude the possibility of the *res* denoting a time (determined by acquaintance) such that it is before the utterance time and later than the believing time. Therefore, von Stechow suggests that the extensional “forward-shifted” reading is barred by the following constraint:

(42) ULC for *res*-time

Let  $i$  be the reference index of a tense in *res*-position, and let  $j$  be the reference index of the ordinary time argument (the evaluation time index). Then, the tense in *res* position has the additional constraint that  $t_i$  is not after  $t_j$ .

Notice also that ULC-*res* does not exclude the possibility of the *res*-time overlapping with the evaluation time. Therefore, a simultaneous *de re* reading is possible, which according to von Stechow is correct. Also, as noted in Ogihara (1999), the revised ULC may explain the double access reading, because the requirement that the reference of the *res* must overlap the speech time but may not be later than the believing time forces it to overlap the believing time.

## 2.4 Gennari’s (2003) Analysis

Gennari has pointed out some theoretical and empirical shortcomings with the previous non-uniform treatments of tenses. First, the non-uniform approach fails to distinguish embedded events from states. This approach systematically predicts that embedded event sentences should receive both the simultaneous and backward shifted interpretations, which is false. Second, a *de re* analysis of the double access sentences as in Abusch-Ogihara’s approach is problematic because for a double access sentence to be true, neither the existence of a state in the actual world that overlaps both the speech time and the attitude time nor the existence of an acquaintance relation is necessary. Therefore, in contrast to Abusch and Ogihara, who have employed different mechanisms to interpret non-embedded and embedded tenses, Gennari has proposed uniform definitions of tense meanings across contexts. She suggests that the exact duration and location of the interval in which a sentence is true is determined by lexical tense meanings and lexical/sentential aktionsart rather than by language specific mechanism such as Sequence of Tense rule (See also Song 2000).



Gennari has assumed the traditional view of tenses as quantifiers and the traditional notion of local evaluation time. For example, past tense is defined as  $\lambda Q\lambda i_0[\exists i [i < i_0 \ \& \ Q(i)]]$ . She takes event time (ET) as the interval specified by the tense operator in which a sentence is true and reference time (RT) is given either by a temporal adverb or by the event time of the previous sentence in a discourse. For example, in the above definition of past tense,  $i$  is the event time and  $i_0$  the local evaluation time. The local evaluation time of a non-embedded tense is the speech time (ST) and the local evaluation time of an embedded tense is the attitude time, i.e., the matrix event time. In addition to the above assumptions, she argues that stative sentences have a temporal superinterval property that distinguish them from event sentences like achievements, accomplishments and activities. According to her, when states are asserted, they are normally true not only at ET but at a larger interval surrounding ET or RT, if RT is present. This is why in (43) the time of leaving cannot overlap with the speech time despite the adverbial modification but in (44) the time of being at home can overlap with the speech time.

(43) John will leave now.

(44) John will be at home (tomorrow/now).

In (43) the leaving time (ET) must be located at an interval later than the speech time as required by the use of *will*. So ET cannot overlap with the speech time. However, in (44), though the ET is also located at a future interval, this sentence has the superinterval property due to its state aktionsart. This superinterval may include the speech time, thus yielding the overlapping reading. This reading can be derived as an inference from the lexical meaning of the verb/the sentence:

(45) John will be at home.

(1)  $\exists i [i > st \ \& \ \text{be-at-home}'(j)(i)]$

(2)  $\exists i_s [\exists i [i > st \ \& \ i \subset i_s \ \& \ \text{be-at-home}'(j)(i_s)]]$

-----  
 $\exists i_s [\exists i [i > st \ \& \ i \subset i_s \ \& \ \text{be-at-home}'(j)(i_s) \ \& \ \mathbf{P} \ st \subset i_s]]$

(P represents the modal operator *possibly* and  $i_s$  is a superinterval.)

With the above theoretical background in mind, now let us see how Gennari analyzes temporal interpretations in embedded contexts. First, consider the case where a past tense is embedded to another past as in (46a), whose logical form is (46b).

(46) a. John thought that Mary was sick.

b.  $\exists i' [i' < st \ \& \ \text{think}'(i', j, \ ^\wedge\lambda i_0\exists i [i < i_0 \ \& \ \text{be-sick}'(i, m)])]$

She has assumed the standard semantics for attitude verbs. So the truth conditions in (46b) say that (46a) is true iff there is time  $i'$  before the speech time at which John thinks in (the actual) world  $w$  and for all the worlds and times  $\langle w_0, t_0 \rangle$  compatible with John's beliefs at time  $t'$  in world  $w$ , Mary is sick at a time earlier than  $t_0$  in  $w_0$ . Consequently, if John's thinking time  $t'$  in  $w$  is a time at which John's cognitive state holds true, it follows that Mary is sick at a time earlier than John's thinking time. This derives the backward shifted interpretation of embedded past. But given that the embedded clause is a state, there is a superinterval  $i_s$  containing  $i$  such that for all subinterval of  $i$ , the state is true. Since it is possible for the superinterval  $i_s$  to extend from a time earlier than the thinking time until the thinking time itself, the interval of thinking and the interval of being sick can overlap, deriving the simultaneous interpretation. It is important to note that on Gennari's analysis, the truth conditions of (46b) do not force the overlapping reading. It is a reading made available by the typical (pragmatic) knowledge associated with the stated described. In other words, whether the backward shifted reading or the simultaneous reading obtains depends on the temporal information available in the context. That the contextual information constrains the temporal interpretation can be clearly illustrated by Gennari's (2003: 57) following example, in which the time of the embedded complement is located around John's childhood rather than his saying time.

(47) John went to a private school when he was a child. He said the school was awful.

In contrast to a state complement, an event complement as in (48) does not have the simultaneous reading, because events do not have the superinterval property.

(48) John believed that Mary went to the party.

It is significant to note that Gennari's account of past under past does not resort to any language specific mechanism such as Sequence of Tense rule. An embedded past has the same meaning as an independent past.

As for temporal interpretations of embedded present, Gennari notes that the double access reading is required when the matrix sentence has a past tense as in (49). But when the matrix sentence has a present or future tense, the embedded present complement can be interpreted as uniquely overlapping the local evaluation time, i.e., the attitude time, without reference to the speech time as in (50).

(49) The president believed that his party is furious.

(50) The press will believe that the president is out of town.

According to Gennari, the above examples have two implications: (i) the denotation of present tense can be either an interval overlapping with the speech time or a future interval without overlapping with the speech time, (ii) the interval denoted by present tense always overlaps with whichever happens to be the evaluation time, be it the speech time or the attitude time. Thus, she proposes that the meaning of present tense requires that the ET of the modified proposition to overlap with the local evaluation time but not to be wholly located before the speech time. The definition of present tense is thus (51), where *o* means *overlap with*.

$$(51) \lambda Q \lambda i [\exists i' [i' o i \ \& \ \neg(i' < st) \ \& \ Q(i')]]$$

Applying this definition to (49) and (50) will yield the following truth conditions, respectively:

$$(52) \exists i_1 [i_1 < st \ \& \ \text{believe}'(i_1, \text{the-president}', \wedge \lambda i_0 \exists i_2 [i_2 o i_0 \ \& \ \neg(i_2 < st) \ \& \ \text{be-furious}'(i_2, \text{his party})])]$$

$$(53) \exists i_1 [i_1 > st \ \& \ \text{believe}'(i_1, \text{the-press}, \wedge \lambda i_0 \exists i_2 [i_2 o i_0 \ \& \ \neg(i_2 < st) \ \& \ \text{out-of-town}'(i_2, \text{the-president})])]$$

Consider (52) first. The truth conditions require that (52) is true iff there is a time  $i_1$  before the speech time at which the president believes that for all worlds compatible with his cognitive state at  $i_1$ , there is an interval  $i_2$  such that  $i_2$  overlaps with the believing time and is not wholly located before the speech time and  $i_2$  is a time at which the party is furious. If  $i_2$  has to overlap with the past believing interval and is not wholly located before the speech time, the only possibility is that it overlaps with the speech time. This is why (49) must have the double access reading.

Next, consider (53). The truth conditions in (53) say that (53) is true iff the press will believe at a future time that the president is out of town at a time overlapping with the press's believing time. Since the embedded complement is a state, it is also associated with a superinterval at which the complement is true. Now if the superinterval is extended enough to overlap with the speech time, (50) will have the double access reading. But if the superinterval does not overlap with the speech time, the state denoted by the complement clause will only overlap with the future attitude time. Which reading is intended is determined by context and pragmatic considerations.

Again, Gennari's analysis of embedded present uses a uniform interpretation of present tense in all contexts. This contrast clearly with previous approaches such as Ogihra's, which explains the double access reading via a *de re* mechanism and the future reading via the deletion rule.

### 3. The Basics of the Temporal Interpretation in Chinese

Before discussing the problem of the temporal interpretation of Chinese embedded clauses, I would like to first briefly outline how the temporal interpretation of independent clauses is determined.

Chinese is usually classified as a tenseless language, as its verbs are not inflected for overt morphological marking of a past/non-past distinction. Thus, unlike the temporal interpretation in English, which can be determined by morphological tenses, the temporal interpretation in Chinese is not determined by tense markers. If we disregard contextual information from previous discourse, there are at least three factors which influence the temporal interpretation of Chinese sentences: (i) the use of temporal adverbials, (ii) the use of aspectual markers, and (iii) default viewpoint aspect. I discuss these factors in turn.

It is self-evident that temporal adverbials determine the temporal interpretation of a sentence. This can be illustrated by (54) and no comment is needed.

- (54) Zhangsan zuotian qu ni jia  
Zhang yesterday go you house  
'Zhangsan went to your house yesterday.'

On the other hand, when a sentence does not contain a temporal adverbial, aspectual markers may determine the temporal interpretation. For example, the use of the experiential marker *-guo* in (55) indicates that the location of the event must temporally precede the speech time.

- (55) Zhnagsan qu-guo ni jia  
Zhangsan go-Asp you house  
'Zhangsan went to your house before./Zhangsan has been to your house.'

However, sometimes a Chinese sentence might contain neither a temporal adverbial nor an aspectual marker, as is illustrated by the examples in (56).

- (56) a. Zhangsan hen mang  
Zhangsan very busy  
'Zhangsan is very busy.'  
b. Zhangsan dapuo yi-ge huaping  
Zhangsan break one-Cl vase  
'Zhangsan broke a vase.'

Read isolatedly, (56a) must be interpreted as equivalent to a present tense sentence and (56b) to a past tense sentence. In Lin (2002, 2003), I have suggested that the temporal interpretation

of such sentences can be determined via their viewpoint aspect. Namely, a sentence with the imperfective viewpoint aspect has a present interpretation, whereas a sentence with the perfective viewpoint aspect has a past interpretation. This is achieved as follows.

Bohnenmeyer and Swift (2001, 2004) have argued that in telicity-dependent languages there is a certain correlation between the telicity of an eventuality description and its aspectual viewpoint when the sentence is not overtly marked for viewpoint aspect. Roughly, according to their analysis, a predicate is telic if it denotes only events that have no part that falls under the same predicate. A predicate is atelic if the events it denotes have at least one non-final part that falls under the same predicate. According to them, cross-linguistically the default viewpoint aspect of telic descriptions is perfective viewpoint, whereas the default viewpoint aspect of atelic descriptions is imperfective viewpoint and this can be derived from a notion of event realization. In this paper, I will assume their notion of default aspect. They define default aspect as in (57a), where  $t_{TOP}$  is equivalent to Klein's (1994) topic time, a time at which a sentence is asserted to be true. The notion of event realization is defined in (57b).

(57) a.  $DASP = \lambda P \lambda t_{TOP} \exists e [REAL_E(P, t_{TOP}, e)]$  (Bohnenmeyer and Swift 2004: 286)

b.  $\forall P, t_{TOP}, e \subseteq E [REAL_E(P, t_{TOP}, e) \leftrightarrow \exists e' [P(e') \wedge e' \subseteq_E e \wedge \tau(e') \subseteq_T t_{TOP}]]$

(58) a. Perfective aspect =:  $\lambda P_{\langle s, t \rangle} \lambda t_{TOP} \exists t [t \subseteq t_{TOP} \wedge P(t)]^5$

b. Imperfective Aspect =:  $\lambda P_{\langle s, t \rangle} \lambda t_{TOP} \exists t [t_{TOP} \circ t \wedge P(t)]$

(Bohnenmeyer and Swift 2004: 280)

The idea of event realization is that a predicate  $P$  is realized by event  $e$  at topic time  $t_{TOP}$  if and only if  $P$  is true of a part  $e'$  of event  $e$  and the run time of  $e'$  is included within the topic

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<sup>5</sup> This is a simplified story of Bohnemeyer and Swift (2004). The reader is referred to their article for more details. Also notice that according to Kamp and Reyle (1993: 513), the relation between an (imperfective) stative sentence and the topic time is an overlap relation, not an inclusion relation. I accept their view and hence use the overlap relation instead of the inclusion relation as in Bohnemeyer and Swift (2004). Another point to notice is that the definitions of perfective/imperfective aspect in (58) are not Bohnemeyers' original definitions. In Bohnemeyer and Swift's (2004) original proposal, there is no time argument in the argument structure of a predicate. The inclusion relation between the topic time and the event argument is mediated through the run time of the event, which is introduced by the viewpoint aspect. Their original definitions of perfective and imperfective aspect are as follows:

(i) a. Perfective aspect =:  $\lambda P_{\langle s, t \rangle} \lambda t_{TOP} \exists e [\tau(e) \subseteq t_{TOP} \wedge P(e)]$

b. Imperfective Aspect =:  $\lambda P_{\langle s, t \rangle} \lambda t_{TOP} \exists e [t_{TOP} \circ \tau(e) \wedge P(e)]$

However, to simplify the discussion, in this paper, I assume that predicates have time arguments. Thus, the relation between the topic time and the event time is expressed directly rather than being mediated through the run time of an event.

time  $t_{TOP}$ . From the above definition, we can infer that for a telic event to be realized (to occur or to happen), the whole event must be completed. Therefore, the default aspect of a telic event is perfective viewpoint, whose formal definition is (58a)—i.e., the perfective viewpoint requires that the event time of a situation be entirely included within the topic time. In contrast, for a (stative) atelic eventuality to be realized, it is sufficient for a part of the atelic eventuality to hold at the topic time. Therefore, the default aspect of an atelic eventuality is the imperfective viewpoint, whose definition requires that the topic time is included within or overlaps with the event time of a situation as in (58b). Given Bohnemeter and Swift’s definitions in (57), we can conclude that the default viewpoint aspect of (56a) is imperfective, whereas the default viewpoint aspect of (56b) is perfective. Therefore, according to Lin’s (2002, 2003) theory, (56a) has a present interpretation and (56b) a past interpretation. The present interpretation of (56a) is derived as follows. The topic time is the speech time by default. Given that the sentence has the imperfective viewpoint aspect, the speech time is included within the situation time. Therefore, (56a) has a present interpretation. In contrast, the default viewpoint aspect of (56b) is perfective. Consequently, the situation time must be included within the topic time. However, the topic time cannot be the speech time, because pragmatically, a telic event must have already happened before one can talk about it. From this, it is inferred that the topic time of (56b) must be a past interval provided by the context.<sup>6</sup> Therefore (56b) has a past interpretation.

Given that perfective aspect in Chinese entails a past interpretation, I suggest that this is incorporated into the definition of perfective aspect as follows.

(59) a. Perfective aspect =:  $\lambda P_{\langle s,t \rangle} \lambda t_{TOP} \lambda t_0 \exists t [t \subseteq t_{TOP} \wedge P(t) \wedge t_{TOP} < t_0]$

(59) is essentially identical to (58a) except for the additional requirement that the topic time needs to precede the local evaluation time designated as  $t_0$ . In independent sentence, this evaluation time is the speech time, whereas in complement clauses, it is the attitude time. As a concrete illustration, let’s apply (59) to (56b). The result is (60a).

(60) a.  $\lambda t_{TOP} \lambda t_0 \exists t \exists x [t \subseteq t_{TOP} \wedge t_{TOP} < t_0 \wedge \text{break}'(t,z,x) \wedge \text{vase}'(x)]$   
 b.  $\lambda R_{\langle i, \langle i,t \rangle \rangle} \lambda t_1 \exists t_2 R(t_2)(t_1)$   
 c.  $\lambda t_0 \exists t_{TOP} \exists t \exists x [t \subseteq t_{TOP} \wedge t_{TOP} < t_0 \wedge \text{break}'(t,z,x) \wedge \text{vase}'(x)]$

I assume that if the output translation of a sentence is of type  $\langle i, \langle i,t \rangle \rangle$ , an existential closure rule as defined in (60b) will automatically close the  $t_{TOP}$  variable in (60a), yielding the representation in (60c). Since (56b) is an independent sentence, the evaluation time  $t_0$  in (60c)

<sup>6</sup> A future event must be overtly marked in Chinese either by a modal auxiliary or temporal adverbials. See Lin (2002, 2003) for some discussions of this issue.

is the speech time. In other words, the topic time must precede the speech time. The precedence relation imposed by the perfective aspect in Chinese thus is functionally much like the past tense in English.

The alert reader might notice that adding a precedence requirement into the definition of the perfective aspect may raise problems in future contexts, because in such contexts the topic time needs to follow the local evaluation time rather than precede it. For example, in the English sentence *John will have already left at four o'clock this afternoon*, the topic time should follow the evaluation time. Indeed, if English perfective aspect is defined as in (59), such problems will arise. However, I would like to argue that Chinese perfective aspect can be defined as in (59), because future contexts in Chinese are incompatible with the perfective aspect.

The aspectual marker *-le* in Chinese is usually analyzed as a perfective marker in that it indicates completion or termination of an event (Smith 1997). Interestingly, this marker is incompatible with the modal auxiliary *hui* ‘will’ as is shown by (61) (Lin 2000).

- (61) \*Zhangsan hui (yijing) likai-le bangongshi (le)  
 Zhangsan will already leave-Asp office Par  
 ‘Zhangsan will have already left the office.’

Notice that not all modal auxiliaries cannot occur with the perfective marker *-le*. Deontic modals such as *bixu* ‘must’ pattern with *hui* ‘will’, but epistemic modals such as *yiding* ‘must’ or *yinggai* ‘should’ are compatible with *-le*. Compare (62) with (63).

- (62) \*Zhangsan bixu (yijing) likai-le bangongshi (le)  
 Zhangsan must already leave-Asp office Par
- (63) Zhangsan yiding/yinggai/kenneg (yijing) likai-le bangongshi (le)  
 Zhangsan must/should/possible already leave-Asp office Par  
 ‘Zhangsan must/should/is likely to have already left the office.’

On the basis of Kratzer’s (1977) modal base analysis of modality, Katz (2003) has pointed out that the interpretation of epistemic modality is present-oriented, whereas deontic modals are future oriented. Given this, we can arrive at the generalization that that modal expressions in Chinese that are future oriented are incompatible with the perfective marker *-le*. In fact, such modals seem also to be incompatible with the imperfective progressive marker *zai*, as the contrast between (63) with (64) indicates.<sup>7</sup>

<sup>7</sup> If (63) is turned into a *ma*-question, a type of yes-no question, the sentence will sound a little bit better as in (i).

(i) ?Zhangsan hui zai dushu ma?

(64) \*Zhangsan hui/bixu zai dushu

Zhangsan will/must Prog study

‘Zhangsan will/must be studying.’

(65) Zhangsan yiding/yinggai zai dushu

Zhangsan must/should Prog study

‘(According to what we know), Zhangsan must/should be studying.’

The above data suggests that future-oriented modals, in contrast to present-oriented modals might not take AspP as their complement.<sup>8</sup> If the perfective aspect does not appear under the scope of a future-oriented modal, then adding the precedence requirement into the definition of the perfective aspect in (59) will not cause problems.

As for the difference between English and Chinese, it can be explained in terms of an AspP parameter, i.e., English future-oriented modals may take AspP as their complement, whereas Chinese future-oriented modals may not. Alternatively, we can say that the notion of perfectivity can be understood in two different ways. One notion of perfectivity is to view an event as completed before the evaluation time; the other notion of perfectivity is simply to view the event as a complete whole without implying completion before the evaluation time. In a language without morphological tenses such as Chinese, the first notion of perfectivity is employed, because this is the way this type of language expresses the notion of past. On the other hand, English has morphological tenses, so it does not need to resort to aspect to express the past. Consequently, the precedence requirement is not incorporated into the definition of English perfective aspect.

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Zhangsan will Prog study Q  
‘Will Zhangsan be studying?’

However, if (63) is turned into an A-not-A question, the sentence is not improved.

(ii) \*Zhangsan hui-bu-hui zai dushu?

Zhangsan will-not-will Prog study

‘Will Zhangsan be studying?’

Also notice that in contrast to the progressive marker *zai*, the durative marker *-zhe* seems able to occur with future-oriented modals. This is illustrated by (iii).

(iii) a. Qiang shang hui gua-zhe yi-fu hua  
Wall on will hang-Asp one-Cl picture

‘There will be a picture hanging on the wall.’

b. Qiang shang bixu gua-zhe yi-fu hua  
Wall on must hang-Asp one-Cl picture

‘(According to the regulations), there must be a picture hanging on the wall.’

I do not know what causes the contrast between *zai* and *-zhe*.

<sup>8</sup> See note 7, however.



#### 4. The Temporal Interpretation of Attitude Complement Clauses

In the last section, I have shown that no matter which strategy of the three factors—temporal adverbials, aspect markers or viewpoint aspect, is involved in interpreting the temporal location of an event, tenses do not play a role. In other words, one does not need tenses, not even empty tenses, to temporally interpret Chinese sentences. This is one of the conclusions that I have arrived at in Lin (2003). I will adopt this view and refer the reader to that article for more arguments for this position.<sup>9</sup>

In section 2, I reviewed several current theories of embedded tenses and showed how they tackle the temporal interpretation of complement clauses in English. For Ogihara, the simultaneous interpretation is a matter of the sequence of tense rule and for Abusch it is a matter of tense constraints and tense presupposition transmission. As for the double access reading, Abusch and Ogihara have proposed a *de re* analysis. In contrast to Abusch-Ogihara's non-uniform analysis, Gennari has proposed a uniform treatment for both the simultaneous and the double access reading which relies less on the tense morphology but more on the lexical aspect of the embedded predicate and the pragmatics. If my conclusion in the last section that Chinese does not have tense (or TP) is correct, Chinese will not have the kind of sequence of tense rule proposed by Ogihara or the kind of tense presuppositions proposed by Abusch. However, from my survey of the temporal interpretation of Chinese embedded clauses, it is very clear that the nature of the embedded predicates and the pragmatics play an important role in determining the temporal interpretation of embedded clauses in Chinese. This suggests that the temporal interpretation of complement clauses in Chinese might lend support to Gennari's approach. In what follows, I will provide an analysis of how the temporal interpretation of complement clauses in Chinese is determined, discussing how it implies for the different theories of embedded tenses.

To begin with, I would like to make a remark on the matrix verb *shuo* 'say', because all the examples I discussed earlier involve this verb. When this verb is followed by a CP complement, the matrix VP constitutes a telic predicate, because the CP complement measures the verb (REF ???). Therefore, by the definition of default aspect, the default viewpoint aspect of a matrix clause with the verb *shuo* 'say' is perfective. It follows from this that the matrix clause gets a past interpretation. On the other hand, if the matrix verb is a stative verb like *xiangxin* 'believe', the matrix clause is atelic. Therefore, its default viewpoint aspect is imperfective, which in turn gives rise to the present interpretation as illustrated by (66).

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<sup>9</sup> In their article, Hu, Pan and Xu's (2001) argue that there is no finite/nonfinite distinction in Chinese. Their discussion can also be seen as evidence that Chinese has no tense.

- (66) a. Zhangsan xiangxin Lisi hen mang  
 Zhangsan believe Lisi very busy  
 ‘Zhangsan believes that Lisi is busy.’  
 b. Zhangsan xiangxin Lisi dapuo huaping  
 Zhangsan believe Lisi break vase  
 ‘Zhangsan believe that Lisi broke a vase.’

Now that we know how matrix clauses in Chinese are temporally interpreted, we turn now to the temporal interpretation of complement clauses. To begin with, consider the case where the embedded predicate is an individual-level predicate as in (7a), reproduced below.

- (7a) Yuehan shuo Mali hen piaoliang  
 John say Mary very beautiful  
 ‘John said that Mary is beautiful.’

As noted, the out of the blue interpretation of (7a) is that the property of being beautiful holds true not only at John’s saying time, but at the speech time as well. According to the temporal interpretation mechanisms outlined in the last section, the viewpoint aspect of the embedded clause in (7a) is imperfective. Therefore, the logical form of (7a) is (67a).

- (67) a.  $\exists t_{\text{Top}} \exists t [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < st \wedge \text{say}'(t, j, \wedge \lambda t_{\text{Top}} \exists t_1 [t_{\text{Top}} \circ t_1 \wedge \text{beautiful}'(t_1, m)]]$   
 b. For any  $w_0 \in W$ ,  $P_0 \in D\langle s, \langle i, t \rangle \rangle$ ,  $a_0 \in A$  and  $t_0 \in T$ ,  $[[\text{shuo}']]_{w_0}(P_0)(a_0)(t_0) = 1$  iff for all world  $w$  and time  $t$  compatible with what  $a_0$  believes in  $w_0$  at  $t_0$ ,  $P_0(w)(t) = 1$ .

If we assume the standard semantics of attitude verbs like the one given in (67b) for the verb *shuo* ‘say’, then according to (67a), (7a) is true iff in the actual world John’s saying/believing time is before the speech time and for all the worlds  $w$  and time  $t$  compatible with John’s beliefs at his saying interval in the actual world, the state of Mary’s being beautiful overlaps with the time  $t$  in the world  $w$ . Thus, if John’s saying interval in (67a) is part of the world-time pairs compatible with his cognitive state, it follows that Mary is beautiful at an interval overlapping with John’s saying interval. As noted, however, (7a) implies that the state of Mary’s being beautiful is true not only at the interval of John’s saying interval but also at the speech time. How do we explain this fact? I suggest that Gennari’s proposed super-interval property plays a role here. In (67a), the asserted truth interval of the complement state is the overlapping interval. However, by the super-interval property of stative sentences, there is a super-interval containing that overlapping interval at which the embedded state is also true. In the case of an individual-level predicate such as *beautiful*, world knowledge tells us that this super-interval can extend from the saying interval to the speech time, because individual-level properties do not change over time. In fact, given the

permanent stable property of individual-level predicates, it can also be inferred that the super-interval of being beautiful can extend from a time earlier than the saying interval to the speech time. Indeed, this is not only a possible reading, but is the most natural interpretation of (7a), giving people’s world knowledge about the properties of being beautiful. (7a) is a very good example illustrating how the properties of an embedded predicate influence the temporal interpretation of a complement clause.

Next, let us consider (7b), where the embedded predicate is a stage-level predicate. According to the analysis proposed above, the logical form of (7b) is no different from that of (7a). The logical form of (7b) is (68).

$$(68) \exists t_{\text{Top}} \exists t [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < st \wedge \text{say}'(t, j, \wedge \lambda t_{\text{Top}} \exists t_1 [t_{\text{Top}} \circ t_1 \wedge \text{busy}'(t_1, j)]]$$

As noted, however, the temporal interpretation of a complement clause with a stage-level predicate or a progressive predicate is more context-sensitive than the temporal interpretation of a complement clause with an individual-level predicate. According to our earlier discussion, the generalization seems to be the following. The out of the blue reading is the double access reading. The backward shifted reading requires that an understood reference time or an overt temporal adverbial modifies the embedded clause. The simultaneous reading requires that an understood reference time or an overt temporal adverbial appears in the matrix clause. The latter two readings are also influenced by the nature of the embedded predicate and the distance between the attitude time and the speech time. I will discuss these different readings in turn.

To begin with, consider (12), reproduced below. This sentence can be used to initiate a discourse. Thus, there is no pre-established reference time available. Nor does the matrix clause or the embedded clause contain an overt temporal adverbial. Therefore, the most natural reading of the first sentence in (12) is the double access reading.

(12) Yuehan shuo ta hen mang, jiao women bu yao chao ta  
 Yuehan say he very busy ask us not want bother him  
 ‘John said that he is busy and asked us not to bother him.’

How is this reading derived? The truth conditions as given in (68) require that the saying interval overlaps with the busy interval. Moreover, the super-interval property of the predicate *mang* ‘busy’ claims that there is a super-interval containing the saying interval at which the predicate *mang* ‘busy’ is true. The existence of this super-interval, however, does not entail that it must extend from the saying interval to the speech time. This is just a permitted possibility, not a necessity. What then forces the double access interpretation of the first half of (12)? As noted, when the matrix clause does not have a covert or overt temporal adverbial to modify it, the implication is that the saying time is close to the speech time. This, together

with the world knowledge that when a person is busy, he is usually busy for some time, then implies that at the speech time, the property of being busy should hold true. Such an implication is further reinforced by the causal relation between the first and the second sentence. In the second half of (12), the speaker is informing the hearer of John's request not to bother him. Since this request is transmitted to the hearer at the speech time, this means that the request should be obeyed at the speech time. From this, it can be inferred that John is still busy at the speech time, because being busy is the reason of the request not to bother him at the speech time. I conclude that the double access reading of (12) is a reading made available by the super-interval property, the distance between the attitude time and the speech time and their interaction with the other sentences in the discourse.

That the double access reading of (12) is a matter of pragmatics inference can be further supported by (69), which differs from (12) only on the part of the second half of the sentence.

(69) Yuehan shuo ta hen mang, suoyi zuotian mei kong lai  
 Yuehan say he very busy so yesterday not free come  
 'John said that he was busy, so he was not free to come yesterday.'

In (69), due to the temporal adverbial *zuotian* 'yesterday', the second half of the sentence is about a past state. This past state is causally related to the complement state of the first sentence. Due to this causal relation, it is inferred that the complement state must hold at the time denoted by the temporal adverbial in the second clause. As a consequence, (69) is most naturally construed as the backward shifted reading rather than the double access reading.

The simultaneous reading of a complement clause with a stage-level predicate can be illustrated by (11), reproduced below.

(11) Ganggang zai dengdai miantan deshihou Yuehan shuo ta hen  
 just-now Prog wait-for interview while John say he very  
 jinzhang  
 nervous  
 'While John was waiting for the interview a moment ago, he said he was very nervous.'

In (11) we have a temporal adverbial in the matrix clause. The truth conditions of (11) assert that the saying interval which is included within the waiting interval overlaps with the nervous interval. From this, it can be inferred that the property of being nervous must hold true at the waiting interval, which is a moment ago. In other words, the fact that when a temporal adverbial appears in the matrix clause, it is interpreted as if it were in the embedded clause is actually an artifact derived from the overlapping relation between the attitude interval and the interval of the embedded state. On the other hand, the super-interval property

of being nervous entails that John was nervous at a bigger interval containing the saying interval. However, the world knowledge tells us that the interval of being nervous would most naturally extend from the waiting interval to the interview interval but would not continue after the interview, because people normally will become un-nervous when the cause of nervousness disappears. This then implies that the super-interval of being nervous does not include the speech time, because the speech time is after the interview, the cause of nervousness. Here, again, we see that the temporal interpretation of the complement clause with a stage-level predicate depends upon people's world knowledge about the property of that stage-level predicate.

Although I will not discuss in detail other examples such as (13) and (14) mentioned in the introduction section, they point to the same conclusion as above.

So far we have seen how the temporal interpretation of a complement clause with a stative predicate is determined. Now I briefly discuss how a complement clause with an eventive predicate is temporally interpreted. Consider (20) again, reproduced below.

(20) Yuehan shuo Mali dapuo huaping  
 John say Mary break vase  
 'John said that he broke a vase.'

In (20), the embedded clause does not have any aspectual marker. Therefore, its viewpoint aspect is determined by default aspect, which is perfective by definition. Accordingly, the logical form of (20) is (70).

(70)  $\exists t_{\text{Top1}} \exists t [t \subseteq t_{\text{Top1}} \wedge t_{\text{Top1}} < st \wedge \text{say}'(t, j, \lambda t_0 \exists t_{\text{Top2}} \exists t_2 \exists x [t_2 \subseteq t_{\text{Top2}} \wedge t_{\text{Top2}} < t_0 \wedge \text{break}'(t_2, j, x) \wedge \text{vase}(x)]]]$

The truth conditions in (70) say that (20) is true iff there is a past event of John's saying/believing and for all his cognitive worlds  $w$  and time  $t$  compatible with his beliefs at the saying interval in the actual world, Mary breaks a vase at a time earlier  $t_0$ . Since  $t_0$  is the attitude time, this means that the breaking time must precede the saying time, thus deriving the backward shifted reading. The situation here is not much different from its English counterpart, given that the perfective aspect in Chinese has a function similar to English past tense.

To summarize this section, I have shown that several factors conspire to determine the temporal interpretation of complement clauses of attitude verbs in Chinese. These factors include:

- (i) aktionsart properties of the embedded clause,

- (ii) the distinction between the perfective and imperfective viewpoint aspect of the embedded clause,
- (iii) the presence/absence of an implicit anaphoric or overt temporal adverbial in the matrix or embedded clause,
- (iv) world or pragmatic knowledge of the typical duration of the embedded predicate

My discussion has shown that whether a complement clause with a stative predicate has the simultaneous or the double access interpretation is determined by the above four factors plus Gennari's super-interval property associated with the stative predicate. If my discussion is correct, it indicates that among all the current theories of embedded tenses such as Abusch's, Ogihara's and Gennari's, perhaps Gennari's theory has a better potential for a universal theory of the interpretation of embedded tenses, because her proposed mechanisms can also be used in tenseless languages such as Chinese. In fact, I also agree with Gennari that the double access reading does not necessarily involve a *de re* attitude as what Abusch and Ogihara have proposed. Consider the following Chinese sentence:

- (71) Jingfang shuo xiongshou shi yi-wei huangzhong ren  
 police said murderer be one-Cl yellow person  
 'The police said that according to their judgment, the murderer is a yellow person.'

(71) must have the double access reading, because the embedded predicate is an individual-level predicate. However, for (71) to be true, it is not necessary that in the actual world the state denoted by the embedded clause exist. The police can make a conclusion about the content of the report simply on the basis of the evidence they have previously acquired such as the hair they have collected. Since the evidence collected and the *res* state are two different things, the evidence is not the *res* state. (71) also challenges the acquaintance relation that a *de re* report needs. It is fairly reasonable that the police may get acquainted with the evidence or those situations that lead them to make the conclusion that the murderer is a yellow person. However, the conclusion is an inference rather than something that the police has get acquainted. It may be the case that in the actual world the conclusion is wrong and hence the state denoted by the complement clause does not exist. Examples like (71) thus argue against a *de re* account for the double access interpretation.

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