

行政院國家科學委員會專題研究計畫 成果報告

漢語時制與時態的進一步研究(2/2)

計畫類別：個別型計畫

計畫編號：NSC93-2411-H-009-003-

執行期間：93年08月01日至94年07月31日

執行單位：國立交通大學外國語文學系暨文化研究所

計畫主持人：林若望

報告類型：完整報告

報告附件：出席國際會議研究心得報告及發表論文

處理方式：本計畫可公開查詢

中 華 民 國 94 年 7 月 29 日

漢語時制與時態的進一步研究 2/2

A Further Study of Tense and Aspect in Chinese 2/2

計畫編號：NSC 93-2411-H-009-003

執行期限：93年8月1日至94年7月31日

主持人：林若望 國立交通大學外文系

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及關係子句的時間解釋，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。
- (v) 包含關係子句的名詞組的範域
- (vi) 包含關係子句名詞組的有定與無定解釋

我們提供豐富的證據論證上述這些因素，再加上完整態與非完整態的時間意義就可以很完善地說明漢語補語子句的時間解釋，我們完全不需要擬設虛語意屬性如 [+present] 或是 [+past] 來解釋漢語的時間意義，如果我們的分析正確，這暗示著漢語的句法結構樹其實不包含時制詞組，時態在漢語中所扮演的角色就如同時制在英語中所扮演的角色。

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 particular the temporal interpretation of complement clauses and relative clauses 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
- (v) The scope of the NP containing a relative clause
- (vi) The (in)definiteness of the NP containing a relative clause

We argue that the above factors, plus the semantics of perfective and imperfective aspect, are sufficient to determine the temporal interpretation of complement and relative clauses. We also argue not only that Chinese has no morphological tenses but there is no need to resort to covert semantic features under a tense node in order to interpret time in Chinese. It is shown that

aspectual markers in Chinese play the role that tense plays in a tense language. This result implies that the Chinese phrase structure has AspP above VP but no TP is above AspP.

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，但是對於補語子句及關係子句的時間解釋，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已經完全執行完畢，且撰寫了一篇 54 頁之論文，投稿到國際期刊 *Journal of Semantics*，此篇論文已經被期刊主編接受出版，預計在 2006 年夏季刊出。現在就此篇論文的重點結果略做說明。我們在文章中的第一部份首先對漢語簡單句的時間解釋做出明確的分析，提出時態是漢語決定時間解是的主要因素，並且對於個別的時態助詞如「了」、「過」、「在」、「著」等提出具體分析，修正我在

2003 年所發表的文章的部分結論，我們主張「了」和「過」是時制與時態的合體，而「在」和「著」則是單純的時態助詞，不摻雜時制意義。知道了漢語簡單具是如何決定時間意義後，我們接著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 (時間後置解釋)，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，並且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，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：Toshiyuki Ogihara (1989, 1995,

1996), Paul Portner (2003) 及 Silvia Gennari (2003)，我們舉例說明上述這些理論都無法真正解釋漢語的補語子句的時間意義，因此需要另循途徑來解釋。

接著我們就介紹決定漢語補語子句時間解釋的方式及其實際操作模式。我們舉例說明漢語帶上非完整態的補語子句雖然可以得到類似英語的時間後置、時間重疊及時間雙指解釋，但是時間雙指解釋其實是語用因素所賦予的解釋，而時間後置解釋則事實間副詞使用的結果，因此單純的補語子句真正所具有的時間意義只有時間重疊解釋，這個結果其實並不使人感到意外，因為補語子句若為非完整態，它的語意上必定要求主要子句的事件時間被包含在從屬子句的事件時間內，因此補語子句的事件時間必定與主要子句的事件時間重疊。

接著下一個章節則是論述有定指示詞及無定名詞組如何影響關係子句的時間解釋，我們觀察到，如果包含關係子句的名詞組帶有指示詞「這」或「那」，那麼關係子句就可以得到過去或現在的語意解釋，而這兩種不同的語意解釋正好和指示詞的直指或是回指意義有關，我們提出了一個整合性的指示詞的意義來決定關係子句的參照時間是說話時間還是一個過去時間，因而解釋了指示詞對關係子句時間意義的影響。至於無定名詞組對關係子句的影響，我們認為主要是和無定名詞組的邏輯範域有關，當無定名詞組加接到 VP 上時，主要子句的事件時間就成為關係子句的參照時間。但無定名詞組若是加接到 IP 上時，因為範域在動詞組之外，所以不能以主要子句的事件時間為參照時間，而必須以說話時間為參照時間，這樣的分析方式不僅適用於完整態關係子句，也適用於非完整態

關係子句。

文章中最後我們討論了一個主語與賓語的不對稱現象，也就是主語名詞組裡的關係子句一定要以說話時間為參照時間，我們認為這是因為主語名詞組在句法上的位置一定高於動詞組，因此動詞所指稱的事件時間不能是參照時間，而必須以說話時間為參照時間。。

。

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，卻對漢語補語子句及關係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。此次的研究計畫我們撰寫了一篇 54 頁之論文，投稿到語意學研究頗負盛名的國際期刊 *Journal of Semantics*，此篇論文已經被期刊主編接受出版，預計在 2006 年夏季刊出。

五、參考文獻

- Abusch, Dorit (1988) "Sequence of tense, Intensionality, and Scope" *Proceedings of the West Coast Conference on Formal Linguistics* 7.1-14.
- Abusch, Dorit (1994) "Sequence of Tense Revisited: Two Semantic Accounts of Tense in Intensional Contexts." Hans Kamp (ed.), *Ellipsis, Tense and Questions*. Shorter version appeared in P. Dekker and M. Stokhof, eds., *Proceedings of the 9th Amsterdam Colloquium, 1993*, Department of Philosophy, University of Amsterdam. Presented at Events and Grammar Conference, Bar-Ilan University, Israel, 28 Oct 1993.
- Abusch, Dorit (1997) "Sequence of Tense and Temporal De Re." *Linguistics and Philosophy* 20.1-50.
- Enç, Mürvet (1987) "Anchoring Conditions for Tense", *Linguistic Inquiry* 18: 633-57.
- Gennari, Silvia P. (2003) "Tense Meanings and Temporal Interpretation", *Journal of Semantics* 20: 35-71.
- Heim, Irene (1994) "Comments on Abusch's Theory of Tense", in Hans Kamp (ed.) *Ellipsis, Tense and Questions*, DYANA deliverable R2.2.B, Uni. Of Amsterdam, pp. 137-177.
- Hu, Jianhua, Haihua Pan and Liejiong Xu (2001) "Is there a finite vs. nonfinite Distinction in Chinese?", *Linguistics* 39-6: 1117-1148.
- Kamp, Hans and Uwe Reyle (1993) *From Discourse to Logic: Introduction to Model-theoretic Semantics of Natural Language, Formal Logic and Discourse Representation Theory*, Kluwer Academic Publishers, Dordrecht.
- Katz, Graham (2003) "On the Stativity of the English Perfect", in Aremis Alexiadou, Monika Rathert and Arnim Von Stechow (eds.) *Perfect Explorations*, Mouton De Gruyter, Berlin, pp. 205-234.
- Kratzer, Angelika (1977) "What 'must' and 'can' Must And Can Mean", *Linguistics*

- and Philosophy 1(3): 337-355.
- Kratzer, Angelika (1998) "More Structural Analogies Between Pronouns and Tenses", in Devon Strolovitch and Aaron Lawson (eds.) *The Proceedings of Semantics and Linguistic Theory VIII*, CLC Publications, Cornell University, Thaca, N.Y., pp. 92-110.
- Lin, Jo-wang (2000) "On the Temporal Meaning of the Verbal *-le* in Mandarin Chinese", *Language and Linguistics* 1(2):109-133
- Lin, Jo-wang (2002) "Selectional Restrictions of Tenses and Temporal Reference of Chinese Bare Sentences", *Lingua* 113:271-302.
- Lin, Jo-wang (2003) "Temporal Reference in Mandarin Chinese", *Journal of East Asian Linguistics* 12: 259-311.
- Ogihara, Toshiyuki (1989) *Temporal Reference in English and Japanese*, Ph.D dissertation, University of Texas at Austin. Distributed by Indian University Linguistics Club, Bloomington.
- Ogihara, Toshiyuki. (1995) Double-access sentences and reference to states. *Natural Language. Semantics*, 3:177-210.
- Ogihara, Toshiyuki (1996) *Tense, Attitudes, and Scope*, Kluwer Academic Publishers, Dordrecht.
- Ogihara, Toshiyuki (1999) "Double –Access Sentences Generalized", in Tanya Matthews and Devon Strolovitch (eds.) *Proceedings From Semantics and Linguistic Theory IX*, February 19-21, 1999, CLC Publications, Cornell University, Ithaca.
- Sandström, Gørel (1993) When-clauses and the temporal interpretation of narrative discourse. PhD thesis, University of Umeå.
- Smith, Carlota (1997) *The Parameter of Aspect*, Kluwer Academic Publishers, Dordrecht.
- Song, Mean-young (2000) "A Semantics of Sequence of Tense without a Sequence of tense Rule", *Language and Information* 4.2: 93-105: 93-105.
- von Stechow (1995a) "On the Proper Treatment of Tense", In the *Proceedings of Semantics and Linguistic Theory V*, CLC Publication, Cornell University, Ithaca, N.Y., pp. 362-386.
- von Stechow (1995b) Tense in Intensional Context: Two Semantic Accounts of Abusch's Theory of Tense", In F. Hamm, J. Kolb and A. von Stechow (eds.) *The Blaubeuren papers: Proceedings of the Workshop on Recent Development in the Theory of Natural Language Semantics*, Seminar für Sprachwissenschaft, Universität Tübingen, pp. 379-433.
- Stowell, Tim (1993) *Syntax of Tense*. Ms. University of California, Los Angeles.
- Stowell, Tim (1996) "The Phrase Structure of Tense", in Johan Roryck and Laurie Zaring (eds.), *Phrase Structure and the Lexicon*, Kluwer Academic Publishers, pp. 277-291.

Abstract

This paper outlines a framework of the temporal interpretation in Chinese with a special focus on complement and relative clauses. It argues that not only Chinese has no morphological tenses but there is no need to resort to covert semantic features under a tense node in order to interpret time in Chinese. Instead, it utilizes various factors such as the information provided by default aspect, the tense-aspect particles, and pragmatic reasoning to determine the temporal interpretation of sentences. It is shown that aspectual markers in Chinese play the role that tense plays in a tense language. This result implies that the Chinese phrase structure has AspP above VP but no TP is above AspP.

1. Introduction

It is well-known that Chinese is a language without tense morphology. However, it is sometimes suggested that it has a possibly empty Inflection (INFL) node (Huang (1998); Li (1990); among others).¹ If this assumption is correct, it implies that Chinese might have semantic features such as [+present] or [+past] under a phonologically empty tense node which determine the temporal interpretation of a sentence. In this paper, I will argue that Chinese not only has no morphological tenses but lacks semantic features in the above sense. Instead, it utilizes various other factors such as the information provided by default aspect, the tense-aspect particles, and pragmatic reasoning to determine the temporal interpretation of sentences.² In particular, I will show that aspect in Chinese plays the role that tense plays in a tense language with respect to the temporal interpretation of a sentence. In other words, the Chinese phrase structure has AspP above VP but there is no TP above AspP. This is true not only for simple sentences but for embedded clauses.

Among the many devices that the Chinese language uses to determine the temporal interpretation of sentences, I will in particular explore the following factors:³

(A) Temporal adverbs: *zuotian* ‘yesterday’, *1996 nian* ‘the year of 1996’, etc.

(B) Modal verbs: *hui* ‘will’, *yinggai* ‘should’, etc.

¹ Both Huang (1998) and Li (1990) do not directly claim the existence of TP in Chinese, though they do claim that the finite-nonfinite distinction in terms of INFL exists. For arguments against Huang’s (1998), Li’s (1990) and other people’s claims about the finite-nonfinite distinction in Chinese, see Hu, Pan and Xu (2001).

² Also see Li (1999), Lin (2003a, 2003c) and Erbaugh and Smith (in press) for relevant discussions.

³ There are other devices such as imperative operators, covert modality in conditional clauses, *de* in cleft constructions, etc., which I will not discuss in this article.

- (C) Aspectual particles: *le* ‘perfective/imperfective’, *guo* ‘perfective’, *zai* ‘imperfective’, *zhe* ‘imperfective’, etc.
- (D) Aktionsart of the VP and viewpoint aspect determined by it.
- (E) Type (in)compatibility between *hui* ‘will/would’ and perfective and imperfective aspect
- (F) Scope of the DP containing a relative clause.
- (G) Definiteness or informational status of the DP containing a relative clause.

In addition to the above factors, there are a number of pragmatic principles that make use of the above pieces of information and determine the temporal interpretation of a clause. To discuss how the above pieces of information are used in interpreting time in Chinese, in what follows, I will discuss the temporal interpretation of Chinese sentences in general and of complement and relative clauses in particular.

2. The Basics of the Temporal Interpretation in Chinese

As noted at the outset of this article, Chinese is usually classified as a tenseless language, as its verbs are not inflected for overt morphological tense markers. Thus, unlike the temporal interpretation in English, which can be determined by morphological tenses, temporal interpretation in Chinese is not determined by tense markers. If we disregard contextual information from the previous discourse, there are at least four main factors which influence the temporal interpretation of simple sentences in Chinese: (i) temporal adverbials, (ii) default viewpoint aspect, (iii) aspectual markers, and (iv) modal verbs. I discuss these factors in turn.⁴ Before doing this, I want to first spell out my assumption about the Chinese phrase structure. I assume that Chinese has the following phrase structure: [CP...[IP... [ModalP... [AspP... [VP...]]]]. There is no TP above Asp, because as I will argue later on, Chinese not only has no morphological tenses but does not resort to covert tense features to interpret time.

2.1 Temporal adverbs

It is self-evident that temporal adverbials play an important role in the temporal interpretation of a sentence, as is illustrated by (1).

- (1) Zhangsan zuotian qu ni jia
 Zhangsan yesterday go you house
 ‘Zhangsan went to your house yesterday.’

⁴ Also See Erbaugh and Smith (in press) for a discussion of these factors.

Though temporal adverbials themselves do not specify the relation between the temporal interval they indicate and that of the event they modify, the viewpoint aspect or the aspectual class to be discussed below determines which interval is included within the other interval, hence making the relation between the temporal adverbial and the event interval clear.

2.2 Default viewpoint aspect

In Chinese the use of a temporal adverbial is not obligatory. It is not uncommon to find sentences without any temporal adverbials or aspectual markers. Illustrated below are some such examples.

- (2) a. Zhangsan hen mang
Zhangsan very busy
'Zhangsan is very busy.'
- b. Ni da lanqiu ma?
you play basketball Q
'Do you play basketball?'
- (3) a. Zhangsan dapuo yi-ge huaping
Zhangsan break one-Cl vase
'Zhangsan broke a vase.'
- b. Ta dai wo qu taibei
ta take me go Taipei
'He took me to Taipei.'

Read in isolation, (2a) is interpreted as equivalent to a present tense sentence and (2b) to a present generic sentence. In contrast, the two sentences in (3) have a past interpretation.⁵

In Lin (2003c), I have suggested that the temporal interpretation of sentences without any temporal adverbs or aspectual markers is determined via their viewpoint aspect. Namely, a sentence with imperfective viewpoint aspect has a present interpretation, whereas a sentence with perfective viewpoint aspect has a past interpretation.⁶ Moreover, I proposed to use Bohnemeyer and Swift's (2001) theory of default aspect to complete the job. According to them, in telicity-dependent languages there is a correlation between the telicity of an eventuality description and its aspectual viewpoint when the sentence is not overtly marked for viewpoint aspect. Roughly, 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 event it denotes has at least one

⁵ Note that when a predicate is non-punctual, an aspectual marker is usually needed, unless the construction is a serial verb construction as in (3b). I have no idea why this is the case.

⁶ Erbaugh and Smith (in press) also propose a theory which is very similar to Lin's (2003c).

non-final part that falls under the same predicate.⁷ According to them, cross-linguistically the default viewpoint aspect of telic predicates is perfective viewpoint, whereas the default viewpoint aspect of atelic predicates is imperfective viewpoint and this can be derived from a notion of event realization. They define default aspect as in (4a), where t_{TOP} is equivalent to Klein's (1994) topic time, a time at which a sentence is asserted to be true. Bohnemeyer and Swift's (2004, p. 286) notion of event realization is defined in (4b).

(4) a. $DASP = \lambda P \lambda t_{TOP} \exists e [REAL_E(P, t_{TOP}, e)]$

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

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

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

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 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. In other words, one can assume that when a predicate is telic, the DASP determines that the aspectual node of the sentence is realized as the perfective aspect whose semantics is defined in (5a)—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 predicate to be realized, it is sufficient for a part of the atelic eventuality to hold at the topic time. Suppose that determination of default viewpoint aspect requires only minimal realization of an event. Then, when a predicate is atelic, the DASP determines that the aspectual node of the sentence is realized as the imperfective aspect whose semantics is defined in (5b), i.e., the topic time is included within the event time.⁸ Given the above discussion, we can conclude that the default viewpoint aspect of (2a) and (2b) is imperfective, whereas the default viewpoint aspect of (3a) and (3b) is perfective.

Before we examine whether the above theory of default aspect and the definitions of perfective and imperfective aspect may really help derive the temporal interpretation in Chinese as I suggested in Lin (2003c), I will further assume two rules as part of the temporal system in Chinese. One rule, as is given in (6a), is a default rule which will assign the speech time as the value of the evaluation time or topic time variable at the root level. Another rule is (6b), which applies at the IP level to an output translation of type $\langle i, \langle i, t \rangle \rangle$, closing an unfilled topic time variable.⁹ I will explain the application of (6b) in more detail later on when

⁷ Atelicity is usually defined in terms of subinterval property. That is, if t is an interval at which an atelic predicate P holds true, then every proper subinterval of t is also an interval at which P is true.

⁸ This is a simplified story of Bohnemeyer and Swift (2004). The reader is referred to their article for more details.

⁹ Presumably, the rule in question applies to IP, because IP is the level where a topic time should be found as in *Zuotian Zhangsan zou-le* 'Yesterday Zhangsan left', where *zuotian* 'yesterday' is adjoined to IP. An alternative is to let this rule apply at CP. This alternative, however, requires that we let quantifier raising get adjoined to CP in (70) and (71) to be discussed later. I will not try to resolve this issue here.

relevant examples are under discussion.

- (6) a. An expression ϕ of type $\langle i, t \rangle$ that serves as a translation of a matrix sentence is true iff $[[\phi]](s^*) = 1$, where s^* is the speech time.
 b. If ϕ is an expression of type $\langle i, \langle i, t \rangle \rangle$, apply the formula ' $\lambda R_{\langle i, \langle i, t \rangle \rangle} \lambda t_1 \exists t_2 R(t_2)(t_1)$ ' to ϕ .

With the above formal machinery in mind, the present interpretation of (2a) and (2b) can be derived as follows. Take (2a) as an illustration. This sentence has the imperfective viewpoint aspect as the default aspect and hence translates as $\lambda t_{\text{Top}} \exists t [t_{\text{Top}} \subseteq t \wedge \text{busy}'(\text{he}') (t)]$. (6a) then applies, yielding $\exists t [s^* \subseteq t \wedge \text{busy}'(\text{he}') (t)]$. Since the speech time is included within the situation time, (2a) has a present interpretation.

In contrast, the default viewpoint aspect of (3a) and (3b) is perfective. So the output translation of (3a) and (3b) are (7a) and (7b), respectively.

- (7) a. $\lambda t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge \text{vase}'(x) \wedge \text{break}'(\text{Zhangsan}') (x)(t)]$
 b. $\lambda t_{\text{Top}} \exists t [t \subseteq t_{\text{Top}} \wedge \text{take}'(\text{me}')(\text{to-Taipei}')(\text{he}') (t)]$

Rule (6a) then applies, deriving the result that the situation time is included within the speech time. This gives rise to problems. If an event is durative as in (3b), it is impossible for that event to be included within the speech time, because the latter is only a moment of time. Thus, (3b) is predicted to have no interpretation, let alone a past interpretation. On the other hand, if an event is instantaneous such as (3a), it is theoretically possible for an instantaneous moment to be included within the speech time. However, sentences such as (3a) are not used to describe instantaneous events at the speech time. They are used to describe past events. The formal mechanism as outlined above does not predict them to have a past interpretation.¹⁰ This indicates that perhaps the definition of perfective aspect as defined in (5a) is inadequate for the temporal interpretation of Chinese.

In order to explain the fact that perfective aspect in Chinese always gives rise to a past interpretation, I propose that the definition of perfective aspect in (5a) as given in Bohnemeyer and Swift (2004) is revised as (8) in Chinese, with a precedence relation between the topic time variable and the evaluation time variable added.

- (8) Perfective aspect = $\lambda P_{\langle i, t \rangle} \lambda t_{\text{Top}} \lambda t_0 \exists t [t \subseteq t_{\text{Top}} \wedge P(t) \wedge t_{\text{Top}} < t_0]$

It is significant to highlight the precedence relation between the topic time and the local

¹⁰ Perhaps one might say that the present interpretation of (3a) is excluded because of a pragmatic reason; namely, normally by the time the speaker knows that an achievement event has happened, it is past, so even if the event is really instantaneous, the perception of it precedes the statement of it. This pragmatic explanation might be right, but the question still arises as to how the past interpretation of sentences like (3a) is formally

evaluation time designated as t_0 . This relation actually incorporates the notion of semantic tense into the semantics of aspect and thus has a strong implication with respect to what tense is in a morphologically tenseless language. That is, the notion of tense in Chinese is expressed in terms of tense-aspectual particles.

As a concrete illustration of (8), let's apply it to (3a). The result is (9a). Since this output translation is of type $\langle i, \langle i, t \rangle \rangle$ with no overt topic time to fill in the value of the topic time variable, rule (6b) applies to existentially close the topic time variable, yielding (9b). Then rule (6a) applies with the speech time filling in the value of the evaluation time variable t_0 , yielding (9c).

- (9) a. $\lambda t_{\text{Top}} \lambda t_0 \exists t \exists x [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0 \wedge \text{break}'(x)(\text{Zhangsan}') (t) \wedge \text{vase}'(x)]$
 b. $\lambda t_0 \exists t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0 \wedge \text{break}'(x)(\text{Zhangsan}') (t) \wedge \text{vase}'(x)]$
 c. $\exists t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < s^* \wedge \text{break}'(x)(\text{Zhangsan}') (t) \wedge \text{vase}'(x)]$

In (9c), since the topic time precedes the speech time, it follows that the breaking event precedes the speech time. Therefore, the precedence relation imposed by the perfective aspect in Chinese is functionally like the past tense in English.

It is important to emphasize the proposed distinction between default perfective and imperfective aspect in Chinese. While imperfective aspect expresses a pure aspectual meaning relating the topic time and the event time, perfective aspect incorporates into its temporal meaning an extra relation between the topic time and the evaluation time. In other words, in addition to its aspectual component, perfective aspect has semantic tense as part of its meaning. This makes perfective aspect and imperfective aspect different in their semantic type. As I will show later, this type distinction also persists in overt aspectual particles such as the perfective markers *le* and *guo* on the one hand and the imperfective markers *zai* and *zhe* on the other hand. That is *le* and *guo* have the evaluation time variable t_0 , but *zai* and *zhe* don't. Note that the default imperfective aspect and the overt imperfective markers *zai* and *zhe* do not have the evaluation time variable not because it is impossible to incorporate such a relation. One can easily add such a relation, namely, $t_{\text{Top}} = t_0$, to the denotation of the imperfective aspect while maintaining the same temporal meaning as before. So the real reason why there is a type distinction between the perfective and imperfective aspect is that only perfective aspect incorporates the meaning of tense and that only semantic tense implies having an evaluation time variable t_0 . This type distinction will become clear in section 2.4 when I discuss the semantics of the future modal *hui* 'will/would' and its interaction with different aspectual markers.

In addition to the default aspect, there is another aspect, called neutral aspect first discussed in Smith (1997), that I will employ in interpreting time in Chinese. This aspect will

be used when I discuss the future modal *hui* ‘will/would’ in section 2.4.

According to Smith (1997), the neutral viewpoint aspect involves the initial point of an eventuality and part of its internal stage but not the end point. It is neither perfective nor imperfective but is aspectually vague, allowing both closed and open interpretations. I will adopt Pancheva’s (2003) formal definition of Smith’s (1997) notion of neutral viewpoint aspect as given below.

(10) Neutral aspect = $\lambda P_{\langle i, t \rangle} \lambda i \exists t [i \supset t \wedge P(t)]$, where $i \in I$, the set of temporal intervals, $i \supset i'$ iff $i \cap i' \neq \emptyset \ \& \ \exists t [t \in i \ \& \ t \notin i' \ \& \ \forall t' [t' \in i' \rightarrow t < t']]$

What (10) says is that there must be an overlap relation between the topic time and the event time and that there is at least one interval that is included in the topic time and precedes the whole event interval. Since the relation between the endpoint of the event and the topic time is not specified, the event may be completely included within the topic time or may just partially overlap it.

I assume that the neutral aspect gets introduced to the syntax of a clause through an aspectual selectional restriction between the modal *hui* ‘will’ and its AspP complement; namely, *hui* ‘will’ must aspectually select a neutral AspP. Moreover, the theory of grammar does not allow projecting an aspectual node without any semantic content. Thus, if no modal like *hui* ‘will/would’ is present in syntax and no overt aspectual particles are present, the default aspect is then operative, introducing either the perfective or imperfective aspect under the Asp node.¹¹ The motivation of neutral aspect will be discussed later on.

2.3 Aspectual markers

Before discussing examples with aspectual markers, I would like to first make a few remarks on event structure. I assume, roughly following Caudal (1999), that (the time of) an eventuality canonically breaks down into (the time of) Inner Stage and (the time of) Result State.¹² For a dynamic event, the Inner Stage of an eventuality e is the event’s development. For a state, the Inner Stage is the state itself. The notion of Result State refers to the result state of an eventuality. This notion is not problematic for accomplishments and achievements. But are activities and states associated with a result state? Traditionally, one would assume that the answer is no. However, I would like to make a novel assumption here. I propose that activities and states can have results, too. To implement this idea, I assume that a function

¹¹ My view here is different from Smith (1997) in that she claims that the neutral aspect is associated with every sentence with no overt aspectual markers. I claim that the neutral aspect appears only under the scope of *hui* ‘will’. The rule of Default Aspect will take care of the other cases.

¹² To simplify the logical formulae, I do not introduce event arguments for verbs. So verbs have only time arguments. Of course, one can assume that verbs have an event argument and time argument simultaneously or just an event argument and derive the time of an eventuality via the trace function.

called *Rstate* is defined in such a way that it may apply to (the time of) any eventuality and returns (the time of) the result state associated with that eventuality. For example, when applied to an accomplishment such as *John goes to America*, it returns (the duration of) the result state of John's being in America. When *Rstate* applies to activities and states, it yields (the duration of) a result state for them. However, the result states for activities and states are a special kind of eventuality, which I will refer to as empty result states and which I assume exist in all times after the eventuality has occurred. The result states that I am assuming are different from the resultant state associated with the perfect as discussed in Parsons (1990). The resultant state of the perfect is something that cannot cease holding at some later time once an eventuality has occurred. In contrast, the result states that I am assuming are more like Parson's (1990) notion of target states. Some target states may cease holding at some later time but some may hold forever. For example, the target state of a theorem being proven must last forever, whereas the target state of a door being bolted may just last for a little while (Kratzer 1994). I assume that empty result states are among those that cannot cease holding at some later time once the event has occurred. The motivation of empty result states will become clearer later. Since we want the inner time and result state time of an event *P* at time *t*, the functions *Istage* and *Rstate* must depend on *P* and can be defined as follows.

- (11) a. *Istage*(*t*,*P*) is defined if $P(t) = 1$, in which case
 (i) if *P* is telic, *Istage*(*t*,*P*) = *t* minus the last point of *t*;
 (ii) if *P* is atelic, *Istage*(*t*,*P*) = *t*.
 b. *Rstate*(*t*,*P*) is defined if $P(t) = 1$, in which case
 (i) if *P* is telic, *Rstate*(*t*,*P*) = the interval at which the result state of *P* exists.¹³
 (ii) if *P* is atelic, *Rstate*(*t*,*P*) = the interval consisting of every moment after *t*.

Another point to make here is that the literature on Chinese aspectual markers such as *le*, *guo* and *zhe* is so huge that it is impossible to give even a brief overview here, due to restrictions of space ((Kong (1986); Huang (1988); Xunning Liu (1988); Yuehua Liu (1988); Shi (1990); Magione and Li (1993); Dai (1994); Ross (1995); Yeh (1996); Smith (1997); Liu (1997); Li (1999); Kang (1999); Lin (2000, 2003a); Klein, Li and Hendriks (2000); to mention just a few). So in this paper, I will focus more on my own view of these markers, leaving the comparison to the reader.

2.3.1 The experiential marker *guo*

Now let us discuss the experiential marker *guo*, which seems to always imply the pastness of the whole eventuality regardless of the situation type involved. This is illustrated by the

¹³ It is notoriously difficult to define result states, so I assume that the value of *Rstate*(*t*,*P*) is not definable in purely linguistic terms. Rather, world and contextual knowledge are needed. However, we can state some

following examples.

- (12) a. Lisi he-guo jiu
Lisi drink-Asp wine
'Lisi drank wine before.'
- b. Lisi zuo-guo yi-ge qishi dangao
Lisi make-Asp one-Cl cheese cake
'Lisi made a cheese cake before.'
- c. Wo xiangxin-guo ni
I believe-Asp you
'I believed you before.'
- d. Lisi die-duan-guo zuo tui
Lisi fall-broken-Asp left leg
'Lisi broke his left leg before.'

(12d) is worth special mentioning here, because it involves a result state. What is interesting about the result state is that it may not hold at the utterance (evaluation) time; namely, the broken leg must be cured before the utterance time. This property of *guo* is known as the “discontinuity effect” in the literature. A very simple way to capture the past interpretation and the discontinuity effect of *guo* is to say that the whole eventuality, including the Inner Stage and the Result State, must precede the evaluation time.

Although the above analysis successfully accounts for the temporal interpretation of the examples in (12b) and (12d), there are reasons to believe that it might be wrong. A few people have observed that the so-called “discontinuity effect” actually displays a definite/indefinite asymmetry.¹⁴ Compare the following pair of sentences:

- (13) a. Lisi nong-huai-guo zhe-bu shouti-diannao
Lisi make-broken-Asp this-Cl laptop
'Lisi broke this laptop before.'
- b. Lisi nong-huai-guo yi-bu shouti-diannao
Lisi make-broken-Asp one-Cl laptop
'Lisi broke a laptop before.'

While (13a) implies that the laptop is already fixed at the speech time, (13b) does not have such an implication. (13b) is compatible with a situation where the broken laptop is fixed or one where it is not fixed yet. In fact, it is even possible that the laptop in (13b) is not fixable at

constraints on the value of $Rstate(t,P)$, for example, the result must follow t . I thank Paul Portner for this remark.

¹⁴ This asymmetry is discussed in Liao (2003), who credits the observation to Jo-wang Lin.

all. It is not clear how this distinction can be captured under the assumption that the inner stage and result state must precede the evaluation time.¹⁵

Another problem with the above analysis is a theory-internal problem. As noted, I assume that activities and states also have result states and they last forever since their coming into existence. This makes it impossible to claim that both the inner stage and result state precede the speech time.

In view of the above problems, I would like to propose to detach the discontinuity effect from the temporal meaning of *guo* and derive it from another well-known property of *guo*, which requires that the eventuality modified by it be repeatable at the evaluation time. The account that I am going to offer is based on Wu's (2005) idea. In (13a), the object DP is a definite noun phrase. The referent of this definite DP is not only the theme of the first laptop-breaking event but also the theme of any other potentially repeated laptop-breaking event. However, in order for the same laptop to be broken in a repeated event, it should be first fixed before it is broken again. Similar remarks apply to the case of the broken leg in (12d). Before one's leg can be broken again, it should be healed first. Therefore, the discontinuity effect of *guo* is actually derivable from the repeatability condition.

What about (13b)? Here, the object DP *yi-bu shouti diannao* 'a laptop' is an indefinite DP, not a definite DP. Therefore, in order for a similar event to reoccur, any indefinite laptop can serve the purpose. Since the laptop involved in the repeated event need not be the same laptop as the one in the original event, there is no requirement that the original laptop be fixed before another one is broken. It might be fixed but this is not a requirement. There is simply no logical connection between the two laptops.

If what I said above is correct, then we can say that the temporal meaning of *guo* only requires that the Inner Stage of the eventuality modified by *guo* precede the evaluation time. On the other hand, the repeatability condition will force the discontinuity effect in most cases, unless the theme of the event is an indefinite DP. Given this, I propose that the temporal meaning of *guo* is the following:

(14) The temporal semantics of *guo*

$$\|\mathbf{guo}\| = \lambda P_{\langle i, t \rangle} \lambda t_{\text{Top}} \lambda t_0 \exists t [P(t) \wedge \text{IStage}(t, P) \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0]^{16}$$

¹⁵ Paul Portner said to me that this theory might come out fine if the result state of the property Lisi breaking a laptop is different from the result state of Lisi breaking the laptop. For example, if the property of Lisi breaking a laptop has the last moment of *t* as its result state, regardless of what happens to any broken laptops. However, it is not clear why the result state of Lisi breaking a laptop should be restricted to only the last moment of *t*.

¹⁶ If we have event rather than time arguments for verbs, the semantics of *guo* can be alternatively defined as in (i). Similar remarks may apply to the semantics of *le* to be discussed later.

Essentially what (14) says is that the use of *guo* requires that the time of the inner stage of an eventuality is included within the topic time t_{Top} , which in turn precedes the evaluation time t_0 . The repeatability condition can be treated as a presupposition of *guo*, though I will not spell out the details. To illustrate, according to (14), (12c) has the syntactic representation in (15a) and is interpreted as (15b), where the speech time is the default evaluation time. (I assume that the subject originates in the specifier position of VP and is later moved to the specifier position of IP.)

(15) a. [IP wo_i [_{AspP} *guo* [_{VP} t_i *xiangxin ni*]]]

b. $\exists t_{\text{Top}} \exists t [\text{believe}'(\text{you}')(\text{I}')(t) \wedge \text{IStage}(t, \lambda t. \text{believe}'(\text{you}')(\text{I}')(t)) \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < s^*]$

Since the inner stage of the believing state is included within a topic time that is located before the speech time, (15) is correctly predicted to have a past reading.

The final point about *guo* that I want to make is that its semantics is not deictic, because when a clause with *guo* is embedded, the evaluation time can be shifted to the matrix event time. This is illustrated by sentences like *Zhangsan shuo ta xiangxin-guo ni* ‘Zhangsan said that he had believed you’. Therefore, the role of *guo* is somewhat like a relative past tense operator. I will come back to this point in more detail later at the end of section 5.

2.3.2 The perfective/imperfective marker *le*

The next aspectual marker to be discussed is the verbal *le*, which like the experiential marker *guo*, is often assumed to be a perfective marker. However, the temporal meaning of *le* differs from that of *guo* in many crucial ways. The following examples illustrate the semantics of *le*.

(16) a. ?Lisi he-le jiu
Lisi drink-Asp wine
‘Lisi drank wine.’

b. Lisi zuo-le yi-ge qishi dangao
Lisi make-Asp one-Cl cheese cake
‘Lisi has made a cheese cake.’

c. Quan xiao de ren dou zhidao-le zhe-jian shi
all school Gen person all know-Asp this-Cl matter
‘All the people in the school have known this matter.’

(i) $\| \mathbf{guo} \| = \lambda P_{\langle i, t \rangle} \lambda t_{\text{Top}} \lambda t_0 \exists e_{\text{is}} \exists e [P(e) \wedge \text{IStage}(e) = e_{\text{is}} \wedge \text{Running-Time}(e_{\text{is}}) \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0]$

- d. Lisi die-duan-le zuo tui
 Lisi fall-broken-Asp left leg
 ‘Lisi has broken his left leg.’

When *le* occurs in an activity as in (16a), the sentence often sounds incomplete and needs another continuing sentence to make it fully grammatical as in *Lisi he-le jiu, ye chang-le ge* ‘Lisi drank wine and sang songs as well’. It is not clear to me why this is the case. Yet to the extent that such patterns are interpretable, they have a past interpretation. (16a) means that the wine-drinking event occurred before the speech time.

When *le* occurs in an accomplishment, it assigns the sentence a past interpretation too. So (16b) means that the cake-making event took place before the speech time.

Not every stative verb may take *le* as a verbal suffix. Verbs like *zhidao* ‘know’, *xiangxin* ‘believe’, *you* ‘have’, etc., may do so, but verbs like *shuyu* ‘belong to’, *renwei* ‘think’, *peifu* ‘admire’, etc., may not. When a stative verb is combined with *le*, the sentence gets an inchoative interpretation. Thus, (16c) implies a change of state from the state of not knowing to the state of knowing. In fact, we do not need to analyze those stative verbs combined with *le* as true stative verbs but can treat them as being type-coerced into achievement verbs. This explains why examples like (16c) are tinted with dynamicity.

Finally, when *le* occurs with an achievement verb or a bisyllabic resultative verb, it implies that the ensuing result state must hold at the evaluation time, though the event itself occurred before that time. Thus, (16d) means that Lisi’s leg-breaking event occurred before the speech time and his leg is still broken at the speech time. This interpretation is similar to the inchoative reading that we saw in (16c), which implies that the new state holds at the speech time. In fact, we can say that (16b) has the same type of interpretation in that though the cake-making event occurred before the speech time, the existence of the cake must hold at the speech time.

It is significant to note that in (16b,c,d), there is no overt temporal adverbial in the sentence. Now consider a case where a temporal adverbial is present as in (17).

- (17) Lisi shang-ge yue die-duan-le tuei
 Lisi last-Cl month fall-broken-Asp leg
 ‘Lisi broke his leg last month.’

In (17), we have a temporal frame adverbial referring to a past interval. Therefore, the leg-breaking event must occur within that past interval. But what about the ensuing result state? Does it still have to hold true at the speech time? It can, but this doesn’t seem to be what is asserted in (17). What is asserted is that the leg-breaking event occurred last month and the state of the leg being broken was true then. The sentence doesn’t say whether Lisi’s leg is still broken or has been healed by the speech time. The situation here is much similar to

the contrast between the following two sentences, where the predicate denotes a state.

- (18) a. Lisi hen jushang
 Lisi very depressed
 ‘Lisi is depressed.’
- b. Lisi shang-ge yue hen jushang
 Lisi last-Cl month very depressed
 ‘Lisi was depressed last month.’

The sentence in (18a) does not have a temporal adverbial, so the topic time is the speech time by default and thus the state is asserted to be true at the speech time. However, when a temporal adverbial is present as in (18b), the state is only asserted to be true of an interval overlapping the interval denoted by the temporal adverbial. The state of being depressed might still be true at the speech time (as can be proved by adding a continuing sentence such as *Xianzai ye hai hen jushang* ‘now he is still depressed’) but this is not part of the assertion made by the speaker.

What we have learned above is this: the temporal interpretation of the result state of an event sentence with *le* seems parallel to that of simple state sentences and can be independent of the temporal interpretation of the inner stage of that event. This is particularly clear in cases where there is no temporal adverbial as in (16d). In (16d), the inner stage is true of an interval before the speech time but the result state must be true at the speech time. This suggests that each of the inner stage and the result state has an independent time at which they are asserted to be true. However, when an overt temporal adverbial is present as in (17), the topic times for the inner stage and the result state are always the same, i.e., the time denoted by the overt temporal adverbial. How can this be explained? One way to account for this is to say that the topic time for the result state is an anaphor-like time variable and hence must be bound by the overt topic time. When there is no overt temporal adverb, the topic time of the inner stage is existentially closed. Suppose that such existentially closed implicit topic times are incapable of serving as a binder. Then the anaphor-like time variable must look for another appropriate antecedent and chooses the speech time, made available by uttering the speech, as its value.

On the basis of the above discussion, I now propose the semantics of the verbal *le* as follows.

(19) The Temporal Semantics of *Le*

$$\|\mathbf{le}\| = \lambda P_{\langle i, t \rangle} \lambda t_{\text{Top}} \lambda t_0 \exists t [P(t) \wedge \text{Istage}(t, P) \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0 \wedge t_{\text{ana}} \subseteq \text{Rstate}(t, P)]$$

Briefly, what (19) says is this: the use of *le* requires that the time of the event’s development, i.e., the inner stage, is included within the topic time t_{Top} , which in turn precedes the evaluation time t_0 , whereas the time of the result state includes a time t_{ana} , an anaphor-like

variable that needs to be bound or given a value from context.

Notice that like the semantics of *guo*, the semantics of *le* in (19) also includes a relation between the topic time and the evaluation time. This is what makes *le* not a pure aspectual marker but a mixture of tense and aspect, analogous to the analysis of *guo*.

Another interesting point about the analysis in (19), which crucially differs from every treatment of *le* in the literature, is that the semantics of *le* is not a pure perfective marker. On the current treatment, *le* has a perfective meaning only with respect to the inner stage as the condition “ $I_{stage}(t,P) \subseteq t_{top}$ ” requires. However, the meaning of *le* also has an imperfective component but this time with respect to the result state. This is reflected by the condition “ $t_{ana} \subseteq R_{state}(t,P)$ ” in (19). Therefore, the meaning of *le* involves both a perfective and an imperfective component.

Notice that the part of imperfective meaning involving the result state is an obligatory component of the meaning of *le* that I am proposing. A potential problem with this claim is how it can deal with activities, which on the traditional assumption have no result states at all. I would like to argue that this is not a serious problem. As noted, I have assumed that the function *Rstate* can apply to any eventuality, including activities and states, yielding the interval consisting of all time afterwards. On this assumption, the truth conditions of (16a) are the following, where the evaluation time and the anaphor-like time variable both pick out the speech time as their value.

$$(20) \exists t_{top} \exists t [drink'(wine')(Lisi')(t) \wedge I_{stage}(t, \lambda t [drink'(wine')(Lisi')(t)]) \subseteq t_{top} \wedge t_{top} < s^* \wedge s^* \subseteq R_{state}(t, \lambda t [drink'(wine')(Lisi')(t)])]$$

The first half of the truth conditions in (20) has no problem. It asserts that the time of the event’s development occurred before the speech time. However, the second half needs some comments. Here we have conditions saying that the wine-drinking activity has an empty result state and the time of that empty result state includes the speech time. How is this claim to be evaluated? As noted, an empty result state does not cease holding once it comes into existence. Consequently, it overlaps the speech time. Therefore, the existence of empty result state does not affect the truth conditions at all. (20) correctly predicts that the activity occurred before the speech time.

A very nice feature of the above treatment of activities is that with the help of (the time of) empty eventualities we can unify the meaning of *le* in all contexts, because we don’t have to say that there is a past-tense-like *le* occurring in activities and an inchoative *le* which is combined with a type-coerced stative verb, an achievement verb or an accomplishment verb. The superficially different *le*’s in all contexts in fact utilize exactly the same meaning as given in (19).

Another point about the temporal semantics of *le* is that just like *guo* it is not deictic. So in a sentence like *Lisi shuo Zhangsan die-duan-le zuo tui* ‘Lisi said that Zhangsan fell and

broke his left leg’, the evaluation time of the embedded clause is not the speech time but the matrix event time.

2.3.3 The progressive marker *zai*

The temporal semantics of the Chinese progressive marker *zai* seems close to that of the English progressive. However, unlike the English progressive marker, the Chinese *zai* may not occur with achievement verbs. The use of *zai* is illustrated below.

- (21) a. Lisi zai xi-zao
 Lisi Prog take-bath
 ‘Lisi is taking a bath.’
 b. Lisi zai xie yi-ben xin shu
 Lisi Prog write one-Cl new book
 ‘Lisi is writing a new book.’
 c. *Lisi zai ying
 Lisi Prog win
 ‘Lisi is winning.’

I propose that the syntactic distribution of *zai* be explained by imposing a selectional restriction on its lexical semantics, namely, *zai* can only modify a dynamic durative event. Ignoring the complexity of intensionality, i.e., the modality meaning of the progressive as discussed in Dowty (1979) and many others, I propose that the temporal meaning of *zai* is as follows.

$$(22) \|\mathbf{zai}\| = \lambda P_{\langle i,t \rangle} \lambda t_{\text{Top}} \exists t [P(t) \wedge t_{\text{Top}} \subseteq \text{Istage}(t,P) \wedge \text{Dynamic}(P) \wedge \text{Durative}(P)]$$

What (22) says is that *zai* requires that the event modified by it be dynamic and durative and that the inner stage, i.e., the event’s development, includes the topic time.

Applying (22) to (21a), for example, we will obtain the following temporal meaning: The inner stage of the bath-taking event includes the topic time, which is the speech time by default. Since the event’s development includes the speech time, it implies that the event is on-going.

Just like *le* and *guo*, the tense semantics of *zai* is not deictic but relative, as is proved by the sentence *Lisi shi-fenzhong qian shuo ta zai xi-zao* ‘Lisi said ten minutes ago that he was taking a bath’, where the time of taking a bath includes the time of saying.

2.3.4 The durative marker *zhe*

Chinese has another imperfective marker, the durative marker *zhe*. This marker only occurs with (possibly stage-level) atelic eventualities (Lin 2003b). The use of *zhe* is illustrated in (23).

- (23) a. Ta zui li jiao-zhe koxiangtang
 he mouth inside chew-Asp chewing-gum
 ‘He is chewing a chewing gum in his mouth.’
- b. Ta liu-zhe yi-tou chang fa
 he wear-Asp one-head long hair
 ‘He wears his hair long.’
- c. *Ta da-puo-zhe beizi
 he hit-broken-Asp cup
 ‘He is/was breaking cups.’
- d. *Ta xie-zhe ling-pian wenzhang
 he write-Asp two-Cl articles
 ‘He is/was writing two articles.’

I define the temporal semantics of *zhe* as follows:

$$(24) \|\mathbf{zhe}\| = \lambda P_{\langle i, t \rangle} \lambda t_{\text{Top}} \exists t [P(t) \wedge t_{\text{Top}} \subseteq \text{Istage}(t, P) \wedge \text{Atelic}(P)]^{17}$$

According to this analysis of *zhe*, (23a) has a present interpretation because the chewing activity must overlap the speech time. (23b) is similar.

Like the other aspectual markers in Chinese, the temporal meaning of *zhe* is relative, not deictic. So in the sentence *Lisi zuotian shuo zhuo shang fang-zhe yi-bei cha* ‘Lisi said yesterday that a cup of tea was placed on the table’, the time of the embedded state overlaps the matrix event time.

2.4 The future modal verb *hui* ‘will’

¹⁷ Some examples such as (i) suggest that *zhe* might also involve the result state of an action as in (i), because what is durative seems to be the result state of the suit being put on, as opposed to (ii), which describes the on-going action of putting on the suit.

- (i) Lisi chuan-zhe xizhuang
 Lisi wear-Asp suit
 ‘Lisi is wearing a suit.’
- (ii) Lisi zai chuan xizhang
 Lisi Prog put-on suit
 ‘Lisi is putting on a suit.’

This problem can be avoided if one assumes that the verb *chuan* in Chinese is lexically ambiguous between a stative and a dynamic meaning. Thus, the verb *chuan* in (i) lexically denotes a state rather than a change of state.

The future modal verb *hui* ‘will/would’ has a relative future meaning rather than a deictic one. When *hui* ‘will/would’ occurs in a simple sentence, the future is relative to the speech time; when it is embedded in a subordinate clause, the future is relative to the matrix event time. This is illustrated by (25a) and (25b), respectively.

- (25) a. Wo hui hen mang
 I will very busy
 ‘I will be busy.’
 b. Zhangsan shuo ta hui hen mang
 Zhangsan say he would very busy
 ‘Zhangsan said that he would be busy.’

I assume that the future modal verb *hui* ‘will/would’ heads the phrase ModalP, which is located above AspP. The basic function of *hui* ‘will/would’ is to locate the topic time introduced by Asp after the evaluation time. The temporal semantics of *hui* ‘will/would’ is given as follows:

$$(26) [[\mathbf{hui}]] = \lambda P_{\langle i, t \rangle} \lambda t \lambda t_0 [P(t) \wedge t_0 < t]$$

Applying (26) to (25a) yields the result in (27b), given the LF in (27a), where the feature [+imperfective] is assumed to introduce the default imperfective meaning.

- (27) a. [IP Wo_i [ModalP hui [AspP Asp_[+imperfective] [VP t_i hen mang]]]]
 b. $\exists t_{\text{Top}} \exists t [\text{be-busy}'(I')(t) \wedge t_{\text{Top}} \subseteq t \wedge s^* < t_{\text{Top}}]$

According to (27b), the time of my being at home includes the topic time, which is located after the speech time. So (25a) has a future interpretation relative to the speech time.

At this point, it is interesting to discuss the interaction between modal verbs and the aspectual markers *le* and *guo*. These two markers are incompatible with the modal auxiliary *hui* ‘will’ as is shown by (28) (Lin 2000).¹⁸

¹⁸ The aspectual marker *le* may appear in future contexts such as a conditional clause or *deng*-clause as in (i) below.

- (i) a. Yaoshi Lisi dang-le zongtong, wo yiding quanli bangzhu ta
 if Lisi select-Asp president I definitely all-effort assist him
 ‘If Lisi is selected as president, I will definitely assist him with all my effort.’
 b. Deng ni nadao-le boshi xuewei, wo jiu mai xin che gei ni
 wait you get-Asp doctor degree I then buy new car for you
 ‘After you have got your doctor degree, I will buy a new car for you.’

Examples such as those in (i) have been taken as evidence that *le* is not a past-tense marker in Chinese (Lin 2000,

- (28) *Lisi hui likai-guo/le bangongshi
 Lisi will leave-Asp office
 ‘Lisi will have left the office.’

Why is *hui* ‘will’ incompatible with *le* and *guo*? I claim that (28) is ill-formed due to a type mismatch. As stated in (26), the function denoted by *hui* ‘will/would’ requires an expression of type $\langle i, t \rangle$ to serve as its argument. However, as discussed earlier, the output translation of the combination of *le/guo* with a VP is an expression of type $\langle i, \langle i, t \rangle \rangle$ due to the addition of an evaluation time variable. Therefore, semantic computation crashes when *hui* ‘will/would’ is combined with an AspP headed by *le* or *guo*. In fact, the ungrammaticality of (28) can be seen as evidence in support of the proposed treatment of *le* and *guo* as involving a precedence relation between the topic time and the evaluation time.

It should be noted that the existential closure rule (6b) cannot apply to the AspP projection in (28), closing the topic time variable first before *hui* ‘will/would’ is combined with the AspP projection. If this were possible, there would be no type mismatch problem. The operation of topic time closure rule cannot apply here because rule (6b) applies to IP instead of AspP. I speculate that this restriction of rule (6b) might be due to the fact that AspP is not a level where one can be certain that no overt topic time can be found. In many cases, an overt adverbial marking the topic time is attached to ModalP or even higher to IP.

In contrast to *le* and *guo*, *hui* ‘will/would’ can be combined with an AspP headed by the progressive marker *zai* or *zhe*, as is shown in (29). This is because the output translation of the combination of *zai/zhe* with a VP is of type $\langle i, t \rangle$, which is exactly the type that *hui* ‘will/would’ requires.

- (29) a. (Wangshang) ni hui-bu-hui hai zai jia-ban?
 night you will-not-will still Prog work-overtime
 ‘Will you be still working overtime at night?’
 b. 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.’

A consequence of the above analysis is that the future modal *hui* ‘will/would’ is predicted to be always incompatible with a perfective aspect under its scope, including the default perfective aspect, because the output translation of the combination of a VP and the default perfective aspect as defined in (8) is of type $\langle i, \langle i, t \rangle \rangle$, too. This then predicts that the

for example). Such examples are indeed evidence that *le* is not an absolute past tense marker but they are still compatible with the claim that *le* has a component of relative past as part of its meaning as I have proposed in this paper. Another thing to note is that even in future contexts as in (ia) and (ib), *le* and *hui* may not occur with each other. If *hui* ‘will’ is added, the sentence becomes ill-formed.

viewpoint aspect of sentences like those in (30) cannot be perfective.

(30) Wo (xiawu) hui xiuli yi-bu che
I afternoon will fix one-Cl car
'I will fix a car (this afternoon).'

If the viewpoint aspect of (30) is not perfective, what is it then? As a first step to answer this question, let us consider the following dialogue:

(31) A: Ni xiawu hui zuo shenme?
you afternoon will do what
'What will you do in the afternoon?'

B: Wo xiawu hui xiuli yi-bu chezi
I afternoon will fix one-Cl car
'I will fix a car in the afternoon.'

A: Si dian deshihou ni hui hai zai xiu che ma?
four o'clock when you will still Prog fix car Q
'Will you be still fixing the car at four o'clock?'

(32) a. B': Shi-de, na-bu che yuji yao xiu san tian
yes that-Cl car estimated need fix three day
'Yes, it is estimated that the fixing of the car will last three days.'

b. B'': Bu, wo yugu xiu dao san dian keyi wancheng,
No I estimate fix until three o'clock may complete
si dian yinggai yijing xiu-hao-le
four o'clock should already fix-complete
'I estimate that I will finish fixing it at three o'clock. It should have been fixed by four o'clock.'

The questions and answers in (31) and (32) show that a future statement such as (31B) may present an open situation. The speaker may intend the future event to be an incomplete (on-going) event as (32B') indicates or a complete event as (32B'') indicates. In fact, it seems quite appropriate to translate (31B) as 'I will be engaged in fixing a car in the afternoon', leaving achievement of the goal of the event open. If the viewpoint aspect of (30) is not absolutely perfective, what is it then? I propose that (30) has a neutral viewpoint aspect as defined in (10) in section 2.2. If the above analysis is right, it is even possible to replace the imperfective aspect in (27) by the neutral aspect. This will make it possible to claim that the aspect under the scope of *hui* 'will' is always the neutral aspect, if no overt aspectual marker is present.

2. 5 Summary of section 2

In this section, I have shown that no matter which of the four factors—temporal adverbials, viewpoint aspect, aspect markers or the future modal *hui* ‘will’, is involved in interpreting the temporal location of an event, there is no need to postulate covert semantic features such as [+present] or [+past] under an empty Tense node. Therefore, apart from the lack of morphological tense, it is reasonable to say that Chinese lacks semantic tense under a syntactic tense node, parallel to English ones. This weakens the possible claim that Chinese has empty tense node in syntax.

However, if semantic tenses are simply understood as ordering relations between time spans, Chinese can be said to have them. Normally, aspects are understood as expressing the inclusion relation \subseteq (perfective) and \supseteq (imperfective) between the event time and the topic time and tenses as the ordering relation between the topic time and the evaluation time. In Chinese, the future relation $>$ is expressed by *hui* ‘will/would’. This element can be seen as a semantic tense. In contrast, the past relation is contained in *le* and *guo*. However, *le* and *guo* contain both the inclusion and ordering relation. Two parts of the information are thus packed into one morpheme. So they can be said to be semantic tense and semantic aspect at the same time. On the other hand, the progressive marker *zai* and the durative marker *zhe* are pure aspectual markers without having any tense meaning.

3. The Temporal Interpretation of Embedded Clauses

3.1 The case of English

The temporal interpretation of embedded tenses/clauses displays interesting properties. Consider the English sentence (33), where a past tense is subordinated to another past tense.

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

(33) has two distinct temporal readings (Costa 1972; Enç 1987; Abusch 1988; Ogihara 1989; among others). 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. The first reading is similar to what (33a) expresses and is sometimes called the simultaneous reading. 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)).¹⁹ The second reading is similar to what (33b) expresses and is often referred to as the backward-shifted reading. However, (33) does not have a reading on which the time of the embedded event follows the time of the matrix event. That is, (33) cannot be equivalent to what (33c) says. This impossible reading is sometimes referred to as the forward-shifted reading.

In contrast to a past tense, if a present tense is c-commanded by 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 (34).

(34) John said that Mary is pregnant.

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

In the above examples, we have a complement clause embedded in an attitude report verb. It has been pointed out that tenses in relative clauses behave differently from tenses 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 (35), where the time of the fish being alive can be understood as simultaneous with a future buying time.

(35) 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 tenses in relative clauses differ from tenses in complement clauses in some ways. First, unlike tenses in complement clauses, tenses in relative clauses can have a forward-shifted reading. For example, in (36), the woman could win the Noble Prize after she married with John.

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

Second, when a present tense in a relative clause is embedded under a past tense as in (37), there is no effect of obligatory double-access. The embedded event in (37) only needs to be co-temporal with the speech time.

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

¹⁹ However, see Kusumoto (1999) for some counterexamples, which have a clear restriction on them.

In summary, English resorts to different tense morphology to express the simultaneous reading, the backward-shifted reading and the double-access reading. These different readings are meant by the above-mentioned authors to stand for distinct semantic analyses rather than mere ways of describing the common sense inferences which arise in different situations. In contrast to English, Chinese lacks inflectional morphology to indicate tenses. It is therefore interesting to see what kind of temporal readings Chinese embedded clauses may get. Does it also have the three different readings which need three different semantic analyses? In what follows, I will show that Chinese complement clauses also display three interpretations. However, what might look like distinct interpretations are actually not semantically distinct. In particular, I will show that the superficially double-access-like interpretation in Chinese is actually the simultaneous reading plus pragmatic inferences and the backward shifted interpretation is the result of the use of an overt or covert temporal adverbial. So in what follows, I will distinguish the term “reading”, which is equivalent to a semantic analysis, from the term “interpretation”, which may refer to possible pragmatic inferences arising in different situations. Thus, one reading (semantic analysis) may have various interpretations depending upon the contexts involved.

3. 2. Chinese embedded clauses

In this section, I will first review the temporal interpretation of complement clauses in Chinese and then the temporal interpretation of relative clauses.

3.2.1 The temporal interpretation of complement clauses

I will discuss the different interpretations of complement clauses on the basis of (i) whether the embedded predicate is an individual-level predicate or a stage-level predicate, (ii) whether the temporal adverbial is in the matrix clause or in the embedded clause and (iii) whether the embedded clause contains an overt aspectual marker.

To begin with, consider the sentences in (38).

- (38) a. Yuehan shuo Mali hen piaoliang
 John say Mary very beautiful
 b. Huiying shuo ta hen jinzhang/mang
 Huiying say she very nervous/busy

In both (38a) and (38b), the matrix and embedded clauses do not contain any temporal adverb or aspectual marker. The embedded predicate in (38a) is an individual-level predicate, whereas the embedded predicate in (38b) is a stage-level predicate. The most natural interpretation of (38a) 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 (38b). Uttered out-of-the-blue, (38b) 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 (39a) or an overt temporal adverbial is present in the embedded clause as in (39b).

- (39) a. Speaker A: Ni zhidao Yuehan zuotian kaoshi de qingxing ma?
you know John yesterday exam 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.'

Like the backward-shifted interpretation of (38b), the pure simultaneous interpretation of (38b) needs support of a pre-established reference time or an overt temporal adverbial. What is different is that in the simultaneous interpretation, the pre-established reference time or the temporal adverbial is part of the matrix clause rather than the embedded clause. This is illustrated by (40).

- (40) 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.'

It is worth noting that in (40) though the temporal adverbial is placed in the matrix clause, it is interpreted as if it were also in the embedded clause. Thus, (40) is interpreted as almost equivalent to: John said that he was nervous at the waiting interval.

The only interpretation of (38b) that does not need a pre-established reference time or an overt temporal adverbial is the one on which the complement clause is true at both the saying time and the speech time. For example, (41) can be uttered out-of-the-blue to initiate a discourse and obtain an interpretation which is close to the English double-access reading.

- (41) 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 was busy and asked us not to bother him.'

In Chinese when the matrix verb *shuo* 'say' is not modified by an overt temporal adverbial as in (41), it usually implies that the saying time is relatively close to the speech time.²⁰ This makes it more likely that the reported state still holds at the speech time if what is said is true, because states usually obtain for an extended interval. In contrast, if the saying/attitude time is not close to the speech time, an overt temporal adverbial is required in the matrix clause as is illustrated in (42). In such cases, the likelihood of the actual temporal persistence of the reported state is lower, though this possibility is not excluded.

(42) 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 a reported state overlaps the speech time is the nature of the stative predicates. Stage-level predicates which denote longer event duration are more likely to overlap the speech time. For instance, (43) implies that the truth interval of the state complement overlaps the speech time even though the subject's saying time is relatively far away from the speech time.

(43) 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 was in a lot of pain because of her bad health.'

Normally, bad health lasts for a period of time and is quite unlikely to change within three days. Therefore, (43) tends to imply that if what is said is true, the truth interval of the reported state overlaps the speech time, though this interpretation is not forced.

The above discussion indicates that if a reported state is true, then whether or not it is still true at the speech time is largely influenced by the properties of the embedded predicate

²⁰ However, in examples such as *Kongfuzi shuo xuesheng bixu zun shi zhong dao* 'Confucius said that students must respect teachers', the saying event can refer to a very remote interval. This is due to people's world knowledge about Confucius, especially the knowledge of his life time. In this article, I will not discuss the life time effect of an NP on the temporal interpretation.

such as the possible duration of the state. This suggests that the probability of the seemingly double-access interpretation in Chinese can be thought of as a scale, the extreme case being the individual-level predicates, which denote more or less permanent properties. If this observation is correct, it suggests that Chinese has no true double-access reading. The superficially double-access-like interpretation is pragmatically determined rather than being grammatically encoded. This interpretation is derived from the simultaneous reading plus pragmatic reasoning associated with the embedded predicate.

In addition to the factors discussed above, the use of aspectual markers such as *le guo*, *zai* and *zhe* influences the temporal location of an embedded event. Some illustrating examples are given below.

- (44) a. Lisi shuo quan cun de ren dou zhidao-le na-jian shi
 Lisi say all village Gen person all know-Asp that matter
 ‘Lisi said that the people of the whole village had known the matter.’
 b. Yuehan shuo Mali sheng-guo qi
 John say Mary get-Asp angry
 ‘John said that Mary was angry (before the saying time).’
- (45) a. Lisi shuo baba zai shuijiao
 Lisi said father Asp sleep
 ‘Lisi said that his father was sleeping.’
 b. Lisi shuo Zhangsan chuan-zhe xizhuang
 Lisi say Zhangsan wear-Asp suit
 ‘Lisi said that Zhangsan was wearing a suit.’

The use of *guo* in (44b) indicates not only that the time of getting angry is before the saying time but also that the ensuing state of being angry no longer holds at that time. In contrast, though the use of *le* in (44a) also indicates that the change of state occurred before the saying time, the resultant state is asserted to be still true at that time. As for (45a) and (45b), due to the use of an imperfective marker, the embedded events in (45a) and (45b) are required to be co-temporal with the matrix saying event.

The final point about the temporal interpretation of complement clauses is that a complement clause has the simultaneous interpretation when it describes a state or has an imperfective marker. When the embedded clause denotes a telic event, only the backward-shifted interpretation is possible, whether or not an overt perfective marker is present. This seems to pattern with the English data.

- (46) Yuehan shuo Mali dapuo-(guo) huaping
 John say Mary break-Asp vase
 ‘John said that Mary had broken a vase.’

3.2.2 The temporal interpretation of the relative clause

As for the temporal interpretations of relative clauses, the Chinese data 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 event time of a Chinese relative clause can be simultaneous with that of a higher clause. This is illustrated in (47), where the time of being alive is co-temporal with the time of buying.

- (47) 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 interpretation, in addition to the backward-shifted interpretation as in (48). That is, the time of the journalist's writing that article can be after the time of hiring him.

- (48) 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 as shown in (49). Interestingly, however, if the demonstrative *na* 'that' in (49) 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 (50).

- (49) 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.'
- (50) 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.'

4. Previous Analyses of Sequence of Tense

The data of sequence of tense in English 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, 1997; Heim 1994; von

Stechow 1995a,b; Kratzer 1998). These authors all agree that the embedded clauses of propositional attitude verbs denote properties of times, and this necessarily yields the simultaneous interpretation when combined with a proper analysis of attitude verbs. I will here summarize Ogihara’s theory as a representative.

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. When an embedded past tense is deleted, the simultaneous reading arises; when it is not deleted, the shifted reading obtains. Take (33) as an example. It has two LFs, depending on whether or not the SOT rule has applied.

- (51) 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’ $\exists t[t < s^* \ \& \ \text{say}'(t, j, \wedge \lambda t_2 \lambda x \exists t_1[t_1 < t_2 \ \& \ \text{be-pregnant}'(t_1, m)])]$

However, as has been repeatedly pointed out, this analysis fails to explain the contrast between stative and eventive clauses. While embedded stative clauses may have a simultaneous reading, eventive clauses do not have such a reading (Portner 2003 and Gennari 2003, for example).

In contrast to the previous authors’ non-uniform approach to tense meanings, Gennari (2003) has proposed uniform definitions of tense meanings across contexts. She suggests that the exact duration and location of the interval at which a sentence is true are determined by lexical tense meanings and lexical/sentential aktionsart rather than by language specific mechanism such as the Sequence of Tense rule. On her analysis, the distinction between stative and eventive clauses comes from the assumption that stative sentences have a temporal superinterval property that eventive sentences lack. More precisely, according to her, when states are asserted, they are normally true not only at the event time but at a larger interval surrounding the event time or the reference time of the clause. The duration and choice of the superinterval are often subject to pragmatic considerations. Again, take the sentence *John said that Mary was pregnant* for example. On the assumption that a past tense denotes a relation according to which the asserted event time, i.e., the time specified by the tense operator, precedes the local evaluation time, the sentence under discussion gets a backward-shifted reading. However, because the embedded clause is a state, due to the superinterval property, the state can be true at a larger interval surrounding the asserted event time, i.e., it is possible for the superinterval of being pregnant to extend from a time earlier than the saying time until the saying time itself, deriving the simultaneous reading.

As pointed out to me by one reviewer, Gennari’s analysis of tenses is quite confusing, because states have the subinterval property rather than the “superinterval property”. The “superinterval property” is just an available pragmatic inference, not any kind of semantic

property that a stative sentence has. For example, if John is at home from 5 to 7, it does not follow that he is at home for a longer time. But it follows that he is at home from 5 to 6. So the only relevant semantic property of stative sentences is the subinterval property. The “superinterval property” is actually not a semantic property of stative sentences.

Another problem with Gennari’s analysis is the assumption that simultaneous readings are derived from backward shifted readings. As pointed out to me by Paul Portner, this analysis runs into problems in explaining the simultaneous readings of (52a) and (52b).

- (52) a. All of a sudden, John felt that Mary was touching his arm.
b. Mary believed that her baby was cute.

(52a) does not require that Mary touch John’s arm for a while before he starts to feel it and (52b) does not require that the baby start being cute before Mary begins to believe it. She can believe he is cute from the moment he’s conceived.

Another recent analysis of sequence of tense is given by Portner (2003), who also resorts to aktionsart properties to explain the overlap or shifted reading of embedded clauses. He has observed that the overlap or non-overlap interpretation is not a phenomenon unique to embedded clauses but can be found in the perfect and temporal sequencing in discourse as well. For example, the temporal interpretations of the following two perfect sentences are sensitive to the eventive vs. stative distinction.

- (53) a. Mary has read *Middlemarch*.
b. Mary has been upset (lately). (Portner 2003: 481)

In (53a), the time of the reading event must precede the speech time, whereas in (53b) the state of Mary being upset may either precede or overlap the speech time. The interpretation of (53a) is the same one as we find in the sentence *John said that Mary read Middlemarch* and the interpretation of (53b) is the same one as we find in *John said that Mary was upset*.

Given the similarity between the perfect, sequence of tense, and temporal sequencing in discourse, Portner argues that the simultaneous or shifted reading is not a consequence of whether a semantically past tense is present or absent but is due to independent factors. He assumes that a past tense morpheme always deletes when it is embedded under another. In other words, embedded clauses are always semantically tenseless, just as a phrase embedded under the perfect operator is. He proposes the following Temporal Sequencing Principle.²¹

- (54) For any tenseless clause ϕ , reference time r , and event e ,

²¹ (54) is a simplified version of Portner’s (2003: 484) Temporal Sequencing Principle, which does not take temporal sequencing in discourse into consideration. For a more complete analysis of temporal sequencing, see Portner (2003) for details.

- (i) if ϕ is not stative: $\|\phi\|^{r,e}$ implies that e precedes r ; and
- (ii) if ϕ is stative: $\|\phi\|^{r,e}$ implies that e either precedes or overlaps r .

Portner's analysis of sequence of tense is very attractive in that it unifies three superficially different temporal phenomena under the same temporal sequencing principle. Attractive though the Temporal Sequencing Principle is, as I will explain later, it cannot be directly applied to the Chinese data.

5. An Analysis of the Temporal Interpretation of Complement Clauses

In the last section, I briefly reviewed three current theories of embedded tenses and showed how they tackle the temporal interpretation of complement clauses in English.

Can any of the three contemporary theories of sequence of tense be extended to account for the temporal interpretation of complement clauses in Chinese? Let us look at Ogihara's theory first. If the conclusion that Chinese does not have a tense projection is correct, the kind of theory that Ogihara has proposed or any other similar theory such as Abusch's is inapplicable to Chinese, because Chinese lacks tense morphemes in the very beginning.

Gennari's proposal might have a chance to be extended to Chinese, given that her account is mainly based on the aktionsart properties and pragmatics of the embedded predicates. However, as noted, her proposed "superinterval property" is not a true semantic property but is really just an available pragmatic inference. Moreover, her analysis fails to explain English examples like (52a) and (52b) and their Chinese counterparts, where the simultaneous reading is not derivable from the backward shifted reading.

The remaining candidate is Portner's proposal. His treatment of embedded clauses as being tenseless makes it very tempting to try to extend his analysis of English to Chinese, because the latter is a tenseless language. Indeed, if the Temporal Sequencing Principle as stated in (54) can be directly applied to the Chinese data, his analysis can be said to gain further support from cross-linguistic data. However, there is a problem with extending his analysis to Chinese. As noted, in Chinese when an embedded predicate is a stative one, the embedded clause has the simultaneous reading but not the shifted reading unless an overt temporal adverbial is present in the embedded clause or a covert one can be inferred from the context. However, the Temporal Sequencing Principle in (54) predicts that Chinese embedded stative clauses without a temporal adverbial should have a backward-shifted reading just like their English counterparts. This prediction is not correct. To rescue this, perhaps one might suggest that the precedence condition be left out from (54). This will not work, however, because leaving out the precedence condition will make an embedded stative clause with an overt temporal adverbial run into problems. Such clauses do allow backward-shifted interpretation. In view of this, I would like to pursue a different approach to the temporal interpretation of complement clauses in Chinese. I will argue that the information provided by

Asp in the embedded clause, plus the semantics of the matrix attitude verb, is sufficient to determine the reading of an embedded stative clause. The other possible interpretations are the products of the use of an overt or covert temporal adverbial or pragmatic reasoning.

To begin with, I would like to make a remark on the matrix verb *shuo* ‘say’, because all the examples I have discussed so far involve this verb. When this verb is followed by a CP complement, the matrix clause gets a past interpretation. This implies that the matrix VP constitutes a telic predicate and has perfective aspect. Indeed, Zagona (to appear) argues that such CP complements measure out the matrix VP. In addition to Zagona’s explanation, it is also easy to see that if a predicate like *shuo Mali hen congming* ‘say that Mary is clever’ is true of an interval, it is not true of any proper subinterval. Therefore, by the definition of default aspect, the default viewpoint aspect of a matrix clause with the verb *shuo* ‘say’ is perfective.

Now that we know how matrix clauses are temporally interpreted, we turn now to the temporal interpretation of complement clauses. First consider a case where the embedded predicate is an individual-level predicate such as the sentence *Yuehan shuo Mali hen piaoliang* ‘John said that Mary was beautiful’ in (38a). As noted, the out-of-the-blue interpretation of this sentence 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 earlier discussion about default aspect, the viewpoint aspect of the embedded clause in (38a) is imperfective. If we assume a semantics of attitude verbs like the one given in (55) for the verb *shuo* ‘say’, then the logical form of (38a) is (56).

(55) For any $w_0 \in W$, $P_0 \in D_{\langle s, \langle i, t \rangle \rangle}$, $a_0 \in A$ and $t_0 \in T$, $[[shuo']]_{w_0}(P_0)(a_0)(t_0) = 1$ iff for all worlds w and times t compatible with what a_0 says in w_0 at t_0 , $P_0(w)(t) = 1$.

(56) $\exists t_{Top} \exists t [t \subseteq t_{Top} \wedge t_{Top} < s^* \wedge say'(t, j, \wedge \lambda t_{Top} \exists t' [t_{Top} \subseteq t' \wedge beautiful'(t', m)])]$

According to (56), (38a) is true if and only if in the actual world John’s saying time is before the speech time and for all the worlds w and times t compatible with John’s beliefs at his saying interval in the actual world, the state of Mary’s being beautiful includes the time t in the world w . Thus, if the world and time of John’s saying in (56) are one of the world-time pairs compatible with what he said, it follows that Mary is beautiful at an interval overlapping John’s saying interval. As noted, however, (38a) 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 think that the implication is a mere inference derived from the pragmatics of individual-level predicates and no formal mechanism akin to the ones proposed for English double access sentences is required to explain it. This inference holds because individual-level predicates such as *piaoliang* ‘beautiful’ normally do not change over time easily. This reasoning is supported by the fact that the English sentence below may have the

same kind of inference even if the embedded clause has a past tense morphology, as one reviewer pointed out to me.

(57) John said that Mary was beautiful.

It is worth noting in passing that my idea here is actually somewhat similar to Gennar's account of English data. The differences are (i) I start off the simultaneous reading rather than deriving it from a backward shifted reading and (ii) I do not bring the confusing concept of "superinterval property" into the explanation.

The pragmatic reasoning under discussion will become even clearer when stage-level predicates are considered. In any case, (38a) 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 (38b), where the embedded predicate is a stage-level predicate. According to the analysis proposed above, the logical form of (38b) is no different from that of (38a). The logical form of (38b) is (58).

(58) $\exists t_{\text{Top}} \exists t [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < s^* \wedge \text{say}'(t, j, \wedge \lambda t_{\text{Top}} \exists t' [t_{\text{Top}} \subseteq t' \wedge \text{busy}'(t', m)]]$

As noted, however, the temporal interpretation of a complement clause with a stage-level predicate is more context-sensitive than the temporal interpretation of a complement clause with an individual-level predicate. According to my earlier discussion, such sentences have various interpretations, including the double-access interpretation, the backward-shifted interpretation and the simultaneous interpretation. Which interpretation is intended depends upon the nature of the embedded predicate, the distance between the attitude time and the speech time and contextual support of temporal adverbials. I will discuss these different interpretations in turn.

First, consider (41), 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. The most natural interpretation of the first sentence in (41) is one on which the embedded proposition is true at the speech time as well as the saying time.

(41) 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 was busy and asked us not to bother him.'

How is this interpretation derived? The truth conditions in (58) require that the saying interval is included within the busy interval. However, this does not entail that the busy interval must extend from the saying interval to the speech time. What then forces the double-access-like interpretation of the first half of (41)? As noted, when the matrix clause does not have a covert or overt temporal modifier, 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 period of time, then implies that at the speech time, the property of being busy should hold true. Such an implication is further reinforced by the explanatory relation between the first and the second sentence. In the second half of (41), 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, it implies by maxim of relevance 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 explanation for the request. I conclude that the interpretation that (41) displays is different from the true double-access reading as we saw in English. The interpretation under discussion is the simultaneous reading, but the distance between the attitude time and the speech time and the interaction between sentences in the discourse may force the sentence to imply that the reported state is still true at the speech time.

That the double-access-like interpretation of (41) is a matter of pragmatics inference is further supported by (59), which differs from (41) only on the part of the second half of the sentence.

(59) 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 (59), 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, (59) is most naturally construed as the backward-shifted interpretation rather than the double-access-like interpretation.

The pure simultaneous interpretation of a complement clause with a stage-level predicate is illustrated by (40), discussed earlier. In (40) we have a temporal adverbial in the matrix clause. The truth conditions of (40) assert that the saying interval included within the waiting interval is included within the nervous interval. From this it can be inferred that the property of being nervous must hold true at the waiting interval. In other words, the fact that a matrix temporal modifier is interpreted as if it also modifies the embedded clause is actually an artifact derivable from the inclusion relation between the attitude interval and the embedded state interval. Moreover, the world knowledge tells us that the interval of being nervous would

most naturally extend from the waiting interval to the interview interval and would normally not continue after the interview is over, because people usually become relaxed when the cause of nervousness disappears. This then implies that the interval of being nervous does not include the speech time, because the speech time is after the interview, i.e., the cause of nervousness.

Although I will not discuss other examples such as (42) and (43) in detail, they point to the same conclusion as above.

To summarize, complement clauses with a stative predicate have the simultaneous interpretation as is required by the information provided by Asp in the embedded clause and the semantics of attitude verbs. However, people's world knowledge about the property of an embedded predicate and other contextual support such as the interaction between sentences in a discourse may cause the reported state to obtain a double-access-like interpretation.

A remaining problem about the temporal interpretation of stative complement clauses is how overt temporal adverbials affect temporal interpretation. Consider the following two sentences.

- (60) a. Zhangsan shuo zuotian Mali hen mang
 Zhangsan say yesterday Mary very busy
 'Zhangsan said that Mary was busy yesterday.'
- b. Zhangsan jintian shuo zuotian Mali hen mang
 Zhangsan tosay say yesterday Mary very busy
 'Zhangsan said today that Mary was busy yesterday.'

The matrix clause in (60a) has a past interpretation because of its default perfective aspect. The embedded clause also has a past interpretation due to the use of the temporal adverbial *zuotian* 'yesterday'. Moreover, the time denoted by this temporal adverbial fills in the topic time variable of the embedded clause. Consequently, the topic time variable of the embedded clause is not bound by a lambda operator.²² It follows from here that even if John's saying interval in (60a) is part of the world-time pairs compatible with what he said, it is not required to be included within the interval of Mary's being busy. The temporal relation between Zhangsan's saying interval and Mary's busy interval can thus be determined only by pragmatics. Indeed, (60a) not only allows a reading where the busy interval and the saying interval are both located at yesterday but also allows the busy interval to precede the saying interval. Only the context of utterance may determine the interpretation. In contrast, if both the matrix clause and the embedded clause contain a temporal adverbial as in (60b), the two

²² When the embedded clause has no free topic time variable, it's of type $\langle s,t \rangle$, rather than the $\langle s \langle i,t \rangle \rangle$ of the stative complement clauses without adverbials. Thus it can't be an argument of *shuo* 'say' under the meaning in (55). This problem can be avoided either by an appropriate type shift or ambiguity for the meaning of *shuo* 'say' or by letting the lambda operator vacuously binding a time variable.

temporal adverbials determine the temporal relation. Thus, (60b) must have a backward shifted reading because the interval denoted by *zuotian* ‘yesterday’ precedes the interval denoted by *jintian* ‘today’.

Having discussed how a stative complement clause is temporally interpreted, I turn now to complement clauses with an eventive predicate. Consider the sentence *Yuehan shuo Mali dapuo huaping* ‘John said that Mary broke a vase’ in (46) again. The default viewpoint aspect of the embedded clause is perfective. Since the embedded clause does not contain an overt topic time, rule (6b) applies to existentially close the topic time variable. Accordingly, the logical form of (46) is (61).

$$(61) \exists t_{\text{Top1}} \exists t [t \subseteq t_{\text{Top1}} \wedge t_{\text{Top1}} < s^* \wedge \text{say}'(t, j, \wedge \lambda t_0 \exists t_{\text{Top2}} \exists t' \exists x [t' \subseteq t_{\text{Top2}} \wedge t_{\text{Top2}} < t_0 \wedge \text{break}'(t', j, x) \wedge \text{vase}'(x)]]$$

The truth conditions in (61) say that (46) is true iff there is a past event of John’s saying and for all worlds w and times t compatible with what he said at the saying interval in the actual world, Mary breaks a vase at a time earlier than t_0 . Since t_0 is the attitude time, this means that the breaking time must precede the saying time, if what is said is true, thus deriving the backward shifted reading.

The backward shifted reading may also be derived by adding a perfective aspectual marker such as *guo* or *le*. The process is very similar to (61) except that the logical form is a little bit different. Take (62a) for instance. Its logical translation is (62b) under the current framework.

(62) a. Yuehan shuo Mali dapuo-guo huaping
 John say Mary break-Asp vase
 ‘John said that Mary broke a vase before.’

$$b. \exists t_{\text{Top1}} \exists t [t \subseteq t_{\text{Top1}} \wedge t_{\text{Top1}} < s^* \wedge \text{say}'(t, j, \wedge \lambda t_0 \exists t_{\text{Top}} \exists t \exists x [\text{vase}'(x) \wedge \text{break}'(x)(\text{Mary}')(t) \wedge \text{IStage}(t, \lambda t \exists x [\text{vase}'(x) \wedge \text{break}'(x)(\text{Mary}')(t)] \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0]$$

In (62b), the topic time of the embedded clause is required to precede the local evaluation time. Since the local evaluation time is the attitude time, the embedded event must precede the matrix saying time. So in this sense, the experiential marker *guo* is like a relative past tense marker. Similar remarks apply to complement clauses with the perfective marker *le*.

As for complement clauses with *zai* and *zhe*, their temporal interpretation is similar to those imperfective stative complements, i.e., the event time of the embedded clause overlaps the event time of the matrix clause. So I omit the details here.

6. An Analysis of the Temporal Interpretation of Relative Clauses

Recall that we discussed (49) and (50), reproduced below, where the aspectual viewpoint of the relative clause is imperfective.

- (49) Wo jian-guo na-wei zai ku de nanhai
 I mee-Asp that-Cl Prog cry Rel boy
 ‘I met that boy who is/was crying.’
- (50) 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.’

(49) and (50) are almost identical in every respect except for the determiner that modifies the object DP. In (49) we have a definite demonstrative determiner, whereas in (50) we have an indefinite numeral determiner. As noted, this difference results in a different temporal interpretation. When a relative clause is contained in an indefinite DP, the time of the event denoted by the relative clause must be simultaneous with the time of the matrix event. In other words, the event time of the relative clause is temporally dependent upon the event time of the matrix clause. In contrast, when a relative clause is contained in a definite DP, it can easily receive a present interpretation regardless of the past interpretation of the matrix clause. This interpretation is available when the demonstrative determiner *na* ‘that’ is interpreted deictically. When it has an anaphoric interpretation, the event time of the relative clause must refer to a contextually determined past time.

Although the choice of different determiners may influence the temporal interpretation of relative clauses, the use of an overt temporal adverbial may override the effect of the determiner. For example, compare (63) with (64). (63) only has the dependent reading on which the time of washing overlaps the time of arguing. The temporally independent later-than-the-matrix interpretation is impossible. In contrast, in (64), with the temporal adverbial *xianzai* ‘now’ inserted to the relative clause, the temporally independent interpretation is easy to get.

- (63) Yuehan zuotian han yiwei zai xi yifu de nühai chaojia
 John yesterday with one Prog wash cloth Rel girl argue
 ‘Yesterday John argued with a girl who was washing clothes.’
- (64) Yuehan zuotian han yiwei xianzai zai (he bien) xi yifu
 John yesterday with one now Prog river bank wash cloth
 de nühai chaojia
 Rel girl argue
 ‘Yesterday John argued with a girl who is now washing clothes (over the river bank) now.’

Unlike imperfective relative clauses, a perfective relative clause without an overt temporal adverbial allows both the temporally dependent and independent interpretation irrespective of the choice of determiners. Therefore, examples such as (65) are ambiguous between the earlier-than-the-matrix and the later-than-the-matrix interpretation regardless of the definiteness of the determiner.

- (65) Mali jia-gei-(le) yi-wei/na-wei huode nuobeier jiang de kexuejia
 Mary marry-to-Asp one-Cl/that-Cl get Nobel prize Rel scientist
 ‘Mary married a/that scientist who got a Nobel Prize (before or after the marriage).’

To sum up, the generalizations of the temporal interpretation of relative clauses in Chinese are:

- (A) When the DP in which a relative clause is embedded is a definite:
 The temporal interpretation of the relative clause is influenced by the deictic vs. anaphoric interpretation of the definite determiner.
- (B) When the DP in which a relative clause is embedded is an indefinite:
 - (i) An imperfective relative clause is temporally dependent upon the matrix event time.
 - (ii) A perfective relative clause can be temporally independent of the matrix event time.
- (C) When a relative clause contains an overt temporal adverbial, the temporal specification of that adverbial overrides the effects of determiners and viewpoint aspect.

6.1 Analysis

Before explaining how the temporal interpretation of relative clauses is determined, I would like to first make some of my assumptions clear. To begin with, as noted earlier, I assume that predicates have an additional argument for time and hence transitive verbs such as *mai* ‘buy’ translate as expressions of type $\langle e, \langle e, \langle i, t \rangle \rangle \rangle$. Secondly, I assume the VP-internal subject hypothesis according to which the subject DP has to move to the specifier position of IP, leaving a trace behind. Thirdly, indefinites may undergo quantifier raising (QR) and be adjoined to VP or IP.²³ Finally, I assume that Chinese relative clauses are interpreted as

²³ It is sometimes claimed that indefinites in Chinese does not partake scope ambiguities and the surface position of a quantified phrase determines its scope (Huang 1998). Thus, sentences such as (i) are not ambiguous with the indefinite having only the narrow scope.

properties and that the semantic denotation of a head noun modified by a relative clause is obtained through Heim and Kratzer's (1998) predicate modification. In Heim and Kratzer's original proposal, time arguments are not taken into consideration. Kusumoto (1999) and Ogiwara (1996, 2004) have extended their analysis to a framework with time as an argument of a predicate as shown in (66).

(66) Predicate Modification (à la Heim and Kratzer (1998))

$$\| [\text{NP}_{[\text{Rel}\dots]}][\text{NP}\dots] \| = \lambda x.\lambda t.\| [\text{Rel}\dots] \| (x)(t) = \| [\text{NP}\dots] \| (x)(t) = 1$$

With the above assumptions in mind, let us now discuss how the definite and indefinite determiners influence the temporal interpretation of relative clauses. As noted, when a relative clause is embedded in a DP with a definite demonstrative, its temporal interpretation varies with the deictic vs. anaphoric interpretation of the demonstrative. Consider the deictic interpretation first. This interpretation requires that the speech time is included within the event time of an imperfective relative, and is later than the event time of a perfective relative.

-
- (i) Mei-ge nanren dou xihuan yi-ge nüren
 every-Cl man all like one-Cl woman
 'Every man loves a (potentially) different woman.'

However, evidence like (i) is not conclusive. It is possible to construct examples where the wide scope reading of the indefinite is the most acceptable one as illustrated in (ii).

- (ii) Mei-ge ren dou kan-guo yi-bu dianying
 every-Cl man all see-Asp one-Cl movie
 'One movie is such that everyone has seen it.'

To express the narrow scope reading of the indefinite, the numeral-classifier *yi-bu* 'one-Cl' in (ii) has to be deleted or the perfective marker *guo* has to be replaced by *le*.

Another example to show that indefinites may partake scope ambiguity has to do with the ambiguity of dative constructions or double object constructions such as (iii) and (iv).

- (iii) Zhangsan song-le yi-ben shu gei mei-ge tongxue
 Zhangsan give-Asp one-Cl book to every-Cl classmate
 (a) 'Every classmate *x* is such that Zhangsan gave a (potentially different) book to *x*.'
 (b) 'One book *x* is such that Zhangsan gave *x* to every classmate.'
- (iv) Laoshi song-(gei)-le mei-ge tongxue yi-ju hua
 teacher give-Asp every-Cl classmate one-sentence word
 (a) 'Every classmate *x* is such that the teacher gave *x* one sentence.'
 (b) 'One sentence *x* is such that the teacher gave *x* to every classmate.'

Given examples like (ii)-(iv), I assume that indefinites have different scope interpretations. For more arguments that Chinese indefinites do display scope ambiguity, see Jiang (1998). Also notice that the wide scope interpretation of an indefinite in Chinese is not necessarily equivalent to a specific indefinite in the sense of Eng (1991). For example, in (v) below, the indefinite *yi-ge ren* 'one person' can have wide scope over the operator *haoxiang* 'seem' but need not be discourse-linked to any domain of individuals.

- (v) Lisi haoxiang aishang-le yi-wei nühai
 Lisi seem love-Asp one-Cl girl
 'Lisi seems to have loved one girl.'

Therefore, one cannot say that the scope ambiguity of an indefinite in Chinese is always a specificity ambiguity.

In other words, when a demonstrative determiner is deictic, the speech time is the evaluation time of the relative clause no matter whether the viewpoint aspect is perfective or imperfective. This is not surprising. The function of a deictic determiner is to refer to something close to the speaker's here-and-now. Thus, I propose that in addition to its referring function, a deictic demonstrative contains a time variable in its denotation that is identified with the speech time and serves as the time argument of the common noun and the evaluation time of the relative clause. Thus, a deictic DP such as *na-wei nanhai* 'that boy' is roughly interpreted as 'the boy who is temporally located at the speech time that I am pointing at'. Similar remarks may apply to the anaphoric interpretation of the demonstrative except that the temporal argument associated with it is not the speech time but a time contextually determined in the discourse. Given this, I propose to unify the deictic and anaphoric interpretation of the demonstrative under a single analysis, where the free time variable t is the time argument introduced by the demonstrative.

$$(67) \|\mathbf{na}\| = \lambda P_{\langle e, \langle i, t \rangle \rangle}. \iota x. [P(x)(t)]$$

In (67), since the temporal argument is a free variable, it is up to the context to determine what exactly it is. It can be the speech time or some other time determined in the context. If the speech time is assigned as its value, the deictic interpretation is derived. If a time introduced before the utterance time is assigned as its value, the anaphoric interpretation is derived. It follows from this analysis and the Predicate Modification rule that the deictic noun phrase *na-wei zai ku de nanhai* 'that boy who is crying' in (49) translates as $\iota x \exists t [s^* \subseteq t \wedge \text{cry}'(x)(t) \wedge \text{boy}'(x)(s^*)]$, explaining the present interpretation of an imperfective relative clause embedded in a deictic demonstrative. The case of the perfective relative clause in (65) is similar. When the demonstrative in (65) is construed deictically, the award of the Nobel Prize must be given prior to the speech time. This in turn allows two possibilities, namely, the award of the Nobel Prize is before the marriage or later than the marriage. Indeed, (65) is ambiguous between these two interpretations. Similar remarks apply to the anaphoric interpretation of the demonstrative except that the value of the temporal argument is not the speech time but a contextually determined time. So I omit the details here.

Before moving on to relative clauses embedded in indefinite DPs, it is worth noting that it is not strange at all for a determiner to encode temporal information as proposed above. For example, Nordlinger & Sadler (2001) and Lecarme (2004) point out that tense morphemes in many languages show up precisely on definite articles. The proposed analysis of the definite demonstrative determiner in Chinese is therefore independently motivated in Universal Grammar.

Turning to relative clauses embedded in an indefinite DP, let us consider (65) first, where the relative clause is perfective. As noted, this sentence is ambiguous between the earlier-than-the-matrix and later-than-the-matrix interpretation irrespective of the definiteness

of the determiner. I already explained why (65) is ambiguous when the determiner is a demonstrative. But why is it also ambiguous when the determiner is indefinite? My answer will rely on Ogihara's (1996) idea that the scope of a relativized DP determines the temporal (in)dependence of the relative clause. According to him, when a relativized DP is QR-ed to a VP, it is within the scope of the tense of the verb. So the tense of the relative clause is temporally dependent on the tense of the verb. In contrast, when a relativized DP is QR-ed to IP, it is outside the scope of the tense of the verb. Therefore, the tense of the relative clause is temporally independent of the tense of that verb. Although Chinese does not have overt tense morphology, I propose that something similar applies.²⁴ When a QR-ed object DP is adjoined to VP within the scope of the matrix aspect, the matrix event time will be the evaluation time or topic time of the embedded aspect, depending on what aspect is involved. When it is adjoined to IP outside the scope of the matrix aspect, the speech time will be the evaluation time or topic time of the embedded aspect. Therefore, Chinese sentences like (65) with an indefinite determiner are ambiguous. When the relativized DP is QR-ed to VP, the logical form of (65) is (68).

(68) LF: [_{CP}[_{IP} Ta₁ [_{infl}' (le) [_{VP2}[_{DP} yi-wei [_{NP}[_{CP} huode nuobeier jiang de] kexuejia]]]₂ [_{VP1} she Asp one-Cl get Nobel prize Rel scientist e₁ jia-gei e₂]]]]
 marry-to

In what follows I provide some crucial steps in deriving the temporal dependent reading of (68). First, as in Ogihara (1996, p. 158), I assume that the QR-ed relativized DP is type raised to a generalized quantifier with a denotation like (69a). This type-raised denotation requires that the temporal argument of the property P is the same as the temporal argument of the NP predicate, i.e., the evaluation time t_0 . Thus when the denotation of the QR-ed relativized DP is combined with the denotation of VP_1 ²⁵, the event time denoted by VP_1 , i.e., the time of marriage, is identified with the evaluation time variable t_0 contained in the denotation of the QR-ed DP, as is shown in (69b). After this step, Asp is then combined with VP_1 , yielding (69c). As we can see in (69c), the award time of the Nobel Prize t is included within a topic time t_{Top} , and the latter must precede the time of the marriage t_2 . This explains the temporal dependency when the QR-ed relativized DP is adjoined to VP. The computation of the remaining steps, including existential closure of the topic time variable and the substitution of the speech time for the time variable t_0 , is as straightforward as before, so I omit them here.

²⁴ Kusumoto (1999) has argued that Ogihara's scope account is problematic because of examples containing NPI's. Space constraint prevents me from discussing this issue. Therefore, I refer the reader to Kusumoto (1999) for the arguments.

²⁵ Here I assume with Heim and Kratzer (1998) that the index of a moved DP serves as a lambda abstractor.

- (69) a. $\|[\text{DP yi-wei}[\text{NP}[\text{CP}\dots][\text{NP}\dots]]]\| = \lambda P_{\langle e, \langle i, t \rangle \rangle} \lambda t_0 \exists t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0 \wedge$
 $\text{win-Nobel-prize}'(x)(t) \wedge \text{scientist}'(x)(t_0) \wedge P(x)(t_0)]$
- b. $\|[\text{VP}_2[[\text{DP}\dots][\text{VP}_1\dots]]]\| = \lambda P_{\langle e, \langle i, t \rangle \rangle} \lambda t_0 \exists t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0 \wedge \text{win-Nobel-prize}'(x)(t) \wedge$
 $\text{scientist}'(x)(t_0) \wedge P(x)(t_0)] (\lambda 2. \lambda t. \text{marry-to}'(2)(1)(t))$
 $= \lambda t_0 \exists t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0 \wedge \text{win-Nobel-prize}'(x)(t) \wedge$
 $\text{scientist}'(x)(t_0) \wedge \text{marry-to}'(x)(1)(t_0)]$
- c. $\|[\text{AspP}\dots [\text{VP}\dots]]\| = \lambda P_{\langle i, t \rangle} \lambda t_{\text{Top}} \lambda t_0 \exists t_2 [t_2 \subseteq t_{\text{Top}} \wedge P(t_2) \wedge t_{\text{Top}} < t_0] (\lambda t_0 \exists t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge$
 $t_{\text{Top}} < t_0 \wedge \text{win-Nobel-prize}'(x)(t) \wedge \text{scientist}'(x)(t_0) \wedge \text{marry-to}'(x)(1)(t_0)])$
 $= \lambda t_{\text{Top}} \lambda t_0 \exists t_2 \exists t_{\text{Top}} \exists t \exists x [t_2 \subseteq t_{\text{Top}} \wedge t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_2 \wedge \text{win-Nobel-prize}'(x)(t) \wedge$
 $\text{scientist}'(x)(t_2) \wedge \text{marry-to}'(x)(1)(t_2) \wedge t_{\text{Top}} < t_0]$

In summary, when the QR-ed object DP is adjoined to VP, before the semantics of Aspect is able to close the event time variable of the matrix VP, it will be identified with the local evaluation time of the relative clause first. The temporally dependent reading is thus derived.

In contrast, when the QR-ed DP is adjoined to IP, by the time the former is combined with the latter, the event time variable of the matrix clause has already been closed by the semantics of the perfective aspect of the matrix clause. Therefore, the speech time will become the default evaluation time of the relative clause as well as the matrix clause. I show some crucial steps below.

- (70) LF: $[\text{IP}_2 [\text{DP yi-wei} [\text{NP}[\text{CP huode nuobeier jang de] kexuejia]_2 [\text{IP}_1 \text{Ta}_1 [\text{Inf}' (le) [[\text{VP}_1$
 $\text{one-Cl get Nobel prize Rel scientist she Asp}$
 $e_1 \text{ jia-gei } e_2]]]]]$
 marry-to

- (71) a. $[[\text{IP}_1]] = \lambda t_{\text{Top}} \lambda t_0 \exists t' [t' \subseteq t_{\text{Top}} \wedge \text{marry-to}'(2)(\text{she}') (t') \wedge t_{\text{Top}} < t_0]$
- b. $[[\text{IP}_2]] = \lambda P_{\langle e, \langle i, t \rangle \rangle} \lambda t_0 \exists t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0 \wedge \text{win-Nobel-prize}'(x)(t) \wedge \text{scientist}'(x)(t_0) \wedge$
 $P(x)(t_0)] (\lambda 2 \lambda t_0 \exists t_{\text{Top}} \exists t' [t' \subseteq t_{\text{Top}} \wedge \text{marry-to}'(2)(\text{she}') (t') \wedge t_{\text{Top}} < t_0])$
 $= \lambda t_0 \exists t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < t_0 \wedge \text{win-Nobel-prize}'(x)(t) \wedge \text{scientist}'(x)(t_0) \wedge$
 $\exists t_{\text{Top}} \exists t' [t' \subseteq t_{\text{Top}} \wedge \text{marry-to}'(x)(\text{she}') (t') \wedge t_{\text{Top}} < t_0] \quad (\text{Rule (6b) and Functional}$
 $\text{Application})$
- c. $\exists t_{\text{Top}} \exists t \exists x [t \subseteq t_{\text{Top}} \wedge t_{\text{Top}} < s^* \wedge \text{win-Nobel-prize}'(x)(t) \wedge \text{scientist}'(x)(t_0) \wedge \exists t_{\text{Top}} \exists t' [t' \subseteq t_{\text{Top}} \wedge$
 $\text{marry-to}'(x)(\text{she}') (t') \wedge t_{\text{Top}} < s^*] \quad (\text{Rule (6a)})$

If the above scope theory of the temporal interpretation of perfective relative clauses is correct, in principle the same analysis should also apply to imperfective relative clauses. Namely, an indefinite DP containing an imperfective relative clause should be able to be adjoined to VP or IP. This then predicts that sentences such as (50) or (63) would be ambiguous the same way as (65) does. However, as mentioned, these two sentences are not

ambiguous. The event time of the imperfective relative clause in these two sentences must be simultaneous with the matrix event time but not with the speech time. Why is the prediction not born out?

Before answering this question, let's examine what the facts are in English. Depraetere (1996) points out that there is an asymmetry between definite and indefinite antecedents with respect to the temporal interpretation of relative clauses with present tense. One pair of examples she has provided is the following:

- (72) a. You will meet a man who is wearing a blue coat.
b. You will meet the man who is wearing a blue coat.

According to her, out of context, the relative clause in (72b) is much more inclined to get anchored to the speech time than (72a). This contrast seems much similar to the contrast observed for the Chinese data discussed above.

On the other hand, notice that Ogihara (1996) has claimed that sentences like (73) are grammatical.

- (73) John met a boy who is crying (in sorrow).

However, Barbara Partee (personal communication) told me that this sentence sounds pretty odd unless with strong contextual support of some kind. For example, if a less introductory verb is used and the relative clause is not merely descriptive but is implying that the state denoted by the relative clause is the result of the matrix clause, then the sentence is OK, especially with help of the temporal adverbial *now* as in (74).

- (74) Your son insulted a little girl who is now crying.

Carlota S. Smith (personal communication) has also pointed out to me that (73) sounds distinctly odd. At the same time, however, she says that the choice of a different verb may change its acceptability. According to her, the following two examples are acceptable, where the relative clause is anchored to the speech time.

- (75) a. I spanked a boy who is crying.
b. I hired a boy who is studying Korean.

What we have learned from Depraetere's, Partee's and Smith's remarks is that the definiteness of a relativized DP does have an effect on the temporal interpretation of the relative clause, but the effect seems removable given a richer context and an appropriate choice of the matrix verb.

Now what is very interesting is that even for those English sentences that allow a present interpretation of the relative clause, the Chinese equivalents of those sentences are not interpreted the same way. The Chinese equivalents can only get the temporal dependent interpretation where the event time of the relative clause overlaps the event time of the matrix verb. This is shown in (76a) and (76b).

- (76) a. Wo da-le yi-wei zai ku de nanhai de pigu
 I spank-Asp one-Cl Prog cry Rel boy Rel bottom
 ‘I spanked a boy who was crying (at the spanking time).’
 ‘*I spanked a boy who is crying (at the speech time).’
- b. Wo guyong-le yi-wei zai du hanwen de nanhai²⁶
 I hire-Asp one-Cl Prog study Korean Rel boy
 ‘I hired a boy who was studying Korean (at the hiring time).’
 ‘*I hired a boy who is studying Korean (at the speech time).’

The above two examples strongly indicate that in Chinese the definite vs. indefinite distinction with respect to the temporal interpretation of an imperfective relative clause is a grammatically encoded distinction that cannot be easily overridden by pragmatics.

Returning to the original question, I recast it as follows. If the proposed scope account of the ambiguity of perfective relative clauses is correct, it suggests that some principle blocks an indefinite DP with an imperfective relative clause from being QR-ed to IP. The question is what this principle is and why it holds. I believe that the answer must be sought through the nature of indefinites. So let me first discuss some properties of indefinites.

Since Milsark (1977), it has been well-known that indefinites have weak (non-presuppositional) and strong (presuppositional) readings. The strong reading presupposes existence of the entities that the indefinites are applied to, whereas the weak reading asserts existence of the entities they are applied to. Diesing (1992) proposes a mapping hypothesis to account for such an ambiguity. According to her, indefinites construed as weak must remain within VP, whereas strong indefinites are interpreted outside VP (i.e., in [SPEC,IP] or adjoined to IP). Suppose that Diesing’s assumption that indefinites adjoined to IP must receive a presuppositional reading is correct. This then predicts that an indefinite DP with an imperfective relative clause is presuppositional when it is adjoined to IP. I suggest that this is exactly what goes wrong for Chinese sentences like (50) or (63) when we try to relate the relative clause to the speech time.

To begin with, let us consider a very interesting set of Chinese data. In Chinese, the

²⁶ This sentence is compatible with a situation where the boy was studying Korean at the hiring time and is still studying it at the speech time. This seemingly double-access-like interpretation is a pragmatic inference. What is excluded is the possibility that the boy is not studying Korean at the hiring time but is studying it at the speech time.

common noun in an indefinite may be overtly topicalized, thus establishing a domain of quantification and making the indefinite specific (Portner 2002; Wu 1998). This is illustrated by (77), where the aspect is perfective as the perfective marker *le* indicates.

(77) Xiaoshuo wo du-le yi-ben/san-ben (le)
 novel I read-Asp one-Cl/three-Cl Asp
 ‘As for novels, I read one/three of them.’

However, if the aspect is imperfective as in (78), topicalizing the common noun of an indefinite is not allowed.

(78) *Xiaoshuo wo zai du yi-ben/san-ben
 novel I Prog read one-Cl/three-Cl
 ‘As for novels, I am reading one/three of them.’

The contrast between (77) and (78) clearly indicates that the descriptive content of an indefinite object in a progressive sentence cannot be topicalized, i.e., adjoined to IP, making the indefinite presuppositional. In fact, even if no topicalization occurs, an indefinite object in a perfective sentence is also more likely to be presuppositional than an indefinite object in an imperfective clause. For example, it is easy to link the indefinite in (79a) with a pre-established set of novels, but this seems quite difficult for (79b). In (79b), the speaker must assert existence of the referent to which the indefinite is applied to.

(79) a. Wo du-le liang-ben xiaoshuo le
 I read-Asp tw-Cl novel Asp
 ‘I read two (of the) novels.’
 b. Wo zai du liang-ben xiaoshuo
 I Prog read two-Cl novel
 ‘I am reading two novels.’
 ‘*I am reading two of the novels.’

Although I don’t know exactly what condition bans the descriptive content of the indefinite in (78) from being adjoined to IP-peripheral, it seems quite plausible to claim that the same condition blocks a relativized indefinite with a progressive relative from being adjoined to IP.

In contrast to indefinites in an imperfective clause, as we saw in (77), the descriptive content of an indefinite in a perfective clause can be easily presupposed. This is parallel to the fact that a relativized DP with a perfective relative can be adjoined to IP.

At this time, it is interesting to note that an indefinite embedded under an intensional verb is ambiguous between a specific and non-specific reading. Thus, (80) can be understood

either as ‘There is a certain policeman such that he is looking for him’ or ‘He is looking for a policeman-any one will do’.

(80) Ta zai zhao yi-wei jingcha
he Prog look-for one-Cl policeman
‘He is looking for a policeman.’

With this in mind, now let us consider a situation where the indefinite object DP in (80) is further modified by a progressive relative as in (81).

(81) Ta zai zhao yi-wei zheng zai ban an de jingcha
he Prog seek one-Cl right Prog investigate case Rel policeman
‘He is seeking a policeman who is investigating a case.’

Interestingly, (81) seems to have only the specific reading, not the nonspecific one.²⁷ Moreover, the relative clause must be anchored to the speech time. At first glance, though this seems to be a counterexample to the proposed scope account of the perfective vs. imperfective distinction, we might find a way out. The first thing to note about (81) is that the matrix clause also has a present interpretation. Now suppose that the relativized DP is adjoined to VP rather than IP. Then, the matrix event time is the topic time of the relative clause. This in turn means that the speech time overlaps the event time of the imperfective relative, as is desired. In other words, for the relative clause in (81) to get anchored to the speech time, no adjunction to IP is necessary. The anchoring to the speech time can be derived by adjunction to VP via the present interpretation of the matrix event. This explains half of the fact observed for (81). Another half is to explain the specificity of the relativized indefinite object DP. I claim that the specificity of the indefinite is also derived by adjunction to VP. When the indefinite is adjoined to VP, it c-commands the intensional verb. Therefore, it is outside the scope of the intensional verb and should be interpreted specifically relative to the latter. There is simply no need for the indefinite to be QR-ed to IP in order to be specific. I conclude that the interpretation of the relativized indefinite in (81) is completely fully compatible with the claim that a relativized indefinite with an imperfective relative is only adjoined to VP when it undergoes QR.

²⁷ I don’t know exactly why (81) strongly favors the specific interpretation. This might be due to the use of the progressive marker in the matrix clause and the pragmatics of the sentence. In contrast to (81), (i) below may have a non-specific interpretation for the indefinite object DP.

(i) Mama xiang zhao yi-wei zheng zai du boshi de xuesheng (lai jiao
Mother want seek one-Cl right Prog study Ph.D Rel student come teach
ta)
him
‘Mother wants to seek a student who is studying for a Ph.D. degree to teach him.’

The above conclusion is further supported by the fact that when the matrix clause in (81) is turned into one that receives a past interpretation, the relative clause is not able to get anchored to the speech time but must be temporally simultaneous with the matrix event time.

(82) Ta xiawu de shihou zai zhao yi-wei zheng zai
 he afternoon DE time Prog seek one-Cl right Prog
 ban an de jingcha
 investigate case Rel policeman

‘In the afternoon, he was looking for a policeman who was investigating a case.’

Like (80), the indefinite in (82) may have a specific interpretation, but the relative clause embedded in it is not anchored to the speech time.

Before closing this section, it is interesting to note a subject/object asymmetry with respect to temporal (in)dependence. We have seen that an imperfective relative embedded in an indefinite in object position must be temporally dependent upon the event time of the matrix clause. Very interestingly, when an imperfective relative is embedded in an indefinite in subject position, this constraint no longer holds. For example, in contrast to (50) and (63), (83) has a reading on which the relative is anchored to the speech time rather than the matrix event time.

(83) (You) yi-wei zai dengdai miantan de yingzhengzhe shi
 have one-Cl Prog wait interview Rel applicant be
 wo-de gao-zhong tongxue
 my high-school classmate

‘An applicant who is waiting to be interviewed was my classmate in high school.’

Why is there a subject/object asymmetry with respect to temporal (in)dependence? I tentatively suggest that the answer is as follows. Let us assume, contra Diesing (1992) and others, that there is no reconstruction for raised subject DPs. Then subject is outside the scope of VP and Aspect. Therefore, a relative clause embedded in a subject indefinite must get anchored to the speech time. Moreover, the information status of subject is different from that of object. When an indefinite appears as the object of a verb, it tends to introduce a new referent into the discourse. Thus, the descriptive part associated with the indefinite determiner also tends to be new information that is asserted in the discourse. In contrast to objects, subjects tend to be more topical and more easily represent old information. Indeed, it sounds to me that the indefinite in (83) has a very strong tendency to be interpreted as a partitive noun phrase, where there is more than one applicant who are waiting to be interviewed. In fact, (83) also implies that both the speaker and the hearer know that there are applicants who

are now under interview. Possibly it is the topicality of the subject position that makes the imperfective relative in (83) much easier to become the presupposition of the indefinite.

Before closing this section, it is interesting to note that the subject/object asymmetry is not unique in Chinese. Carlota S. Smith (personal communication) has informed me that reduced relatives in English show a similar contrast. Here are some examples provided by her:

- (84) a. A boy crying in the corner was spanked by the teacher.
b. The boy crying in the corner was spanked by the teacher.

The reduced relative in both of these sentences seem to have only the interpretation where the crying event is anchored to the speech time. In contrast, the interpretation seems different for non-subjects in (84):

- (85) a. Mary married a boy studying Korean. –probably past
b. Mary married the boy studying Korean. –probably present

7. Concluding Remarks

In this paper, I have discussed how the temporal interpretation of Chinese sentences is determined via viewpoint aspect, verbal semantics, temporal adverbials, the definite/indefinite distinction, quantifier raising, informational status, pragmatics and people's knowledge of the world. An important conclusion that we may reach from the discussion is that there is no need to resort to covert semantic features under an empty tense node in order to interpret time in Chinese. This then questions the need to postulate an empty tense node in the Chinese phrase structure, because such a node will not play a role in semantics. Instead, aspect in Chinese seems to play the role that tense plays in a tense language, because often aspect alone can determine the temporal interpretation of a clause. This is true not only for simplex sentences but also for complex ones. If this implication is correct, it raises a very interesting question about what the IP, that a subject noun phrase targets, really is, given that Chinese also has no agreement at all. I do not know the answer at this stage and would like to leave this question to syntacticians, who might have a better answer to it.

Author's address
Department of Foreign Languages and Literatures
National Chiao Tung University
1001 Ta Hsueh Road
Hsinchu, Taiwan

e-mail: jowang@mail.nctu.edu.tw

Acknowledgments

*I am very grateful to Hana Filip, Paul Law, Barbara H. Partee, Carlota S. Smith, and two anonymous referees for valuable discussions and comments that have greatly improved the content of this paper. I am also indebted to Paul Portner. Without his detailed written comments and suggestions, this paper would not have taken the form it has now. Any remaining error is my own responsibility. This research was supported by NSC Grants from Taiwan #92-2411-H-009-008 and #93-2411-H-009-003.

References

- Abusch, Dorit (1988), Sequence of tense, intensionality, and scope. *Proceedings of the West Coast Conference on Formal Linguistics* 7:1-14.
- Abusch, Dorit (1994), Sequence of tense revisited: two semantic accounts of tense in intensional contexts. In Hans Kamp (ed.), *Ellipsis, Tense and Questions*. Department of Philosophy, University of Amsterdam. 87-139.
- Abusch, Dorit (1997), Sequence of tense and temporal de re. *Linguistics and Philosophy* 20:1-50.
- Bohnenmeyer, Jürgen and Mary Swift (2001), Default aspect: the semantic interaction of aspectual viewpoint and telicity. In *Proceedings of Perspectives on Aspect*, Utrecht Institute of Linguistics. (Paper downloaded from http://www.uilots.let.uu.nl/conferences/Perspectives_on_Aspect/P_o_A_index.html)
- Bohnenmeyer, Jürgen and Mary Swift (2004), Event realization and default aspect. *Linguistics and Philosophy* 27: 263-296.
- Caudal, Patrick (1999), Result states and the lexicon: the proper treatment of event structure. In *Proceedings of the Ninth Meeting of the European Chapter of the Association for Computational Linguistics (EACL'99)*. University of Bergen, Bergen, Norway. 233-236.
- Costa, Rachel (1972), Sequence of tense in that-clause. In P. Peramteau, J. Levi and G. Phares (eds.) *Papers from the Eight Regional Meeting*. Chicago Linguistic Society, University of Chicago, Chicago, Illinois. 41-51.
- Dai, Yaojing (1994), Le zai biaoshi weilaiyi yi juzi zhong de yongfa [Usage of *le* in sentences expressing future meaning]. In Zhihong Yu (ed.), *Xiandai Yuyanxue: Lilun Jianshe De Xin Shikao*. Yuwen Chubanshe. Beijing. 115-122.
- Depraetere, Ilse (1996), *The Tense System in English Relative Clauses: A Corpus-Based Analysis*. Mouton de Gruyter. Berlin.
- Diesing, Molly (1992), *Indefinites*. MIT Press. Cambridge, MA.
- Dowty, David. (1979), *Word meaning and Montague Grammar*. D. Reidel. Dordrecht.

- Enç, Mürvet (1987), Anchoring conditions for tense. *Linguistic Inquiry* **18**: 633-57.
- Enç, Mürvet (1991), The Semantics of specificity. *Linguistic Inquiry* **22**: 1-25.
- Erbaugh, Mary and Carlota S. Smith (in press), Temporal interpretation in Mandarin Chinese. *Linguistics*.
- Gennari, Silvia P. (2003), Tense meanings and temporal interpretation. *Journal of Semantics* **20**: 35-71.
- Heim, Irene (1994), Comments on Abusch's theory of tense. In Hans Kamp (ed.), *Ellipsis, Tense and Questions*. DYANA deliverable R2.2.B. University Of Amsterdam. 137-177.
- Heim, Irene and Angelika Kratzer (1998), *Semantics in Generative Grammar*. Basil Blackwell. Oxford.
- Hu, Jianhua, Haihua Pan, and Xu Liejiong (2001), Is there a finite vs. nonfinite distinction in Chinese? *Linguistics* **39**: 1117-1148.
- Huang, James C.-T. (1998), *Logical Relations in Chinese and The Theory of Grammar*. Garland Publishing, Inc. New York.
- Huang, L. Meei-jin (1988), *Aspect: A General System and Its manifestation in Mandarin Chinese*. Student Book Company. Taipei.
- Jiang, Yan (1998), Remarks [on scope interpretation in Chinese](#). In Yang Gu (ed.), *Studies in Chinese Linguistics*. Linguistic Society of Hong Kong Book Series. 117 - 142.
- Kang, Jian (1999), *The Composition of the Perfective Aspect in Mandarin Chinese*, Unpublished Ph.D. thesis. Boston University. Boston, MA.
- Klein, Wolfgang (1994), *Time in language*. Routledge. London.
- Klein, Wolfgang, Li Ping and Henriette Hendriks (2000), Aspect and assertion in Mandarin Chinese. *Natural Language and Linguistic Theory* **18**: 723-770.
- Kong, Lingda (1986), Guanyu dongtai zhuci 'guo₁' han 'guo₂' [On dynamic particles *guo₁* and *guo₂*]. *Zhongguo Yuwen* **4**: 272-280.
- Kratzer, Angelika (1994), The Event Argument and the Semantics of Voice. Unpublished MS. University of Massachusetts. Amherst, MA.
- Kratzer, Angelika (1998), More structural analogies between pronouns and tenses. In Devon Strolovitch and Aaron Lawson (eds.), *The Proceedings of Semantics and Linguistic Theory VIII*, CLC Publications. Cornell University. Ithaca, N.Y. 92-110.
- Kusumoto, Kiyomi (1999), *Tense in Embedded Contexts*. Ph.D. thesis. University of Massachusetts. Amherst, MA.
- Lecarme, Jacqueline (2004), Tense in nominals. In Guéron and Jacqueline Lecarme (eds.), *The Syntax of Time*. MIT Press. Cambridge, MA. 441-476.
- Li, Audrey Yen-hui (1990), *Order and Constituency in Mandarin Chinese*. Kluwer Academic Publishers. Dordrecht.
- Li, Tiegeng (1999), *The Study of Tense in Modern Chinese*. Liaoling University Press. Shenyang.
- Liao, Xiu-zhen (2003), *The Study of Result States and the Aspectual-Temporal Meaning of*

- GUO in Mandarin Chinese*. Unpublished MA thesis. National Chiao Tung University. Hsinchu, Taiwan.
- Lin, Jo-wang (2000), On the temporal meaning of the verbal *-le* in Mandarin Chinese, *Language and Linguistics* **1(2)**:109-133
- Lin, Jo-wang (2003a), Selectional restrictions of tenses and temporal reference of Chinese bare sentences. *Lingua* **113**:271-302.
- Lin, Jo-wang (2003b), Aspectual selection and temporal reference of the Chinese aspectual marker *-zhe*. *Tsinghua Journal of Chinese Studies* **32**: 257-295.
- Lin, Jo-wang (2003c), Temporal reference in Mandarin Chinese. *Journal of East Asian Linguistics* **12**: 259-311.
- Liu, Yuehua (1988), Dongtai zhuci ‘guo₁’, ‘guo₂’, ‘le₁’ yongfa bijiao [A comparative study of the dynamic particles guo₁, guo₂ and le₁]. *Yuwen Yanjiu* **1**: 6-16.
- Liu, Xiaomei (1997), *Guo Ming Ke Yu De Dongtai Wenfa Tixi Ji Dongtaici De Shangjia Dongmao Yuyi* [The Grammatical System of Mood in Mandarin Chinese, Southern Min Chinese and Haka Chinese and the Aspectual Meanings of Aspectual Markers]. The Crane Publishing Co., LTD. Taipei.
- Liu, Xunning (1988), Xiandai hanyu ciwei ‘le’ de yufa yiyi. *Zhongguo Yuwen* **5**: 321-330.
- Magione, L and Dingxuan Li (1993), A compositional analysis of *-guo* and *-le*, *Journal of Chinese Linguistics* **21**: 65-122.
- Milsark, Gary (1977), Toward an explanation of certain peculiarities of the existential construction in English. *Linguistic Analysis* **3**: 1-29.
- Nordlinger, Rachel & Louisa Sadler (2001), Nominal tense with nominal scope: a preliminary sketch. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG01 Conference*. CSLI publications. Stanford, CA.
- Ogihara, Toshiyuki (1989), *Temporal Reference in English and Japanese*. Unpublished Ph.D. thesis. Distributed by Indian University Linguistics Club. Bloomington.
- Ogihara, Toshiyuki (1995), Double-access sentences and reference to states. *Natural Language Semantics* **3**:177-210.
- Ogihara, Toshiyuki (1996), *Tense, Attitudes, and Scope*. Kluwer Academic Publishers. Dordrecht.
- Ogihara, Toshiyuki (2004), Adjectival relatives. *Linguistics and Philosophy* **27**: 557-608
- Pancheva, Roumyana (2003), The aspectual makeup of perfect participles and the interpretations of the perfect. In A. Alexiadou, M. Rathert, and A. von Stechow (eds.), *Perfect Explorations*. Mouton de Gruyter. 277-306.
- Parsons, Terence (1990), *Events in the Semantics of English*. MIT Press. Cambridge MA.
- Portner, Paul (2002), Topicality and (non-)specificity in Mandarin. *Journal of Semantics* **19**: 275-287.
- Portner, Paul (2003), The (temporal) semantics and (modal) pragmatics of the perfect, *Linguistics and Philosophy* **26**: 459-510.

- Ross, Claudia (1995), Temporal and aspectual reference in Mandarin Chinese. *Journal of Chinese Linguistics* **23**: 87-135.
- Shi, Zhiqiang (1990), Decomposition of perfectivity and inchoativity and the meaning of the particle *Le* in Mandarin Chinese. *Journal of Chinese Linguistics* **18**: 95-124.
- Smith, S. Carlota (1997), *The Parameter of Aspect*. Kluwer Academic Publishers. Dordrecht.
- von Stechow (1995a), On the proper treatment of tense. In *Proceedings of Semantics and Linguistic Theory V*. CLC Publications. Ithaca, New York. 362-386.
- von Stechow (1995b), Tense in intensional context: two semantic accounts of Abusch's theory of tense. In F. Hamm, J. Kolb and A. von Stechow (eds.), *The Blaubeuren Papers: Proceedings of the Workshop on Recent Development in the Theory of Natural Language Semantics*. Universität Tübingen. 379-433.
- Stowell, Tim (1993), Syntax of tense. Unpublished MS.
- Stowell, Tim (1996), The phrase structure of tense. In Johan Roryck and Laurie Zaring (eds.), *Phrase Structure and the Lexicon*. Kluwer Academic Publishers. 277-291.
- Yeh, Meng (1996), An analysis of the experiential *guo*_{EXP} in Mandarin Chinese: a temporal quantifier. *Journal of East Asian Linguistics* **5**: 151-182.
- Wu, J. (1998), Topic, floating quantifiers, and partitivity. In P. Tamanji & K. Kusumoto (eds.), *The Proceedings of NELS 28*. GLSA. Amherst, MA.
- Wu, Jiun-Shiung (2005), Discontinuity and the semantics of experiential *guo* in Mandarin. Paper presented at the third workshop on formal syntax and semantics. April 16-17, National Tsinghua University. Hsinchu, Taiwan.
- Zagona, Karen (to appear), Measuring out complement clause tenses. *Probus*.