Processing Tenses for the Living and the Dead:

A Psycholinguistic Investigation of Lifetime Effects in Tensed and "Tenseless" Languages

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This dissertation is dedicated to

Zhicai Zhu and Meixiang Wu.

They #are/??were remarkably loving grandparents.

Acknowledgements

My interest in tense originates from a long-held fascination for time travelling (and perhaps an equally long-held struggle with English tenses). If I could go back in time when I was a first-year undergrad, there are many things that I would tell the 18-year-old Sherry to do differently. The last two years, in particular, witnessed my constant struggles to try and figure out many things that had left me confused and troubled, but I'd like to think that now is the time to finally say that coming to Oxford is the best decision I've ever made. And here's why.

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Finally, to my present and future self: you go girl!

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Chapter 1

Overview

The enterprise of Universal Grammar sets down the research agenda of identifying shared properties in the structure of natural language. One possible area in which structural universals may come about is the expression of time, or more specifically, the domain of tense.

The grammatical expression of time has been claimed to be "a universal property of language" (Lecarme, 2004, p. 7), but there are cross-linguistic differences concerning its morpho-syntactic construction. Tense is one grammaticalised form of temporal relations, which seems to be overtly encoded in some languages but not the others, leading to a distinction between tensed and the so-called "tenseless" languages. For example, the English past tense copular *was* in (1) clearly locates the event of Mary's studying in the past, whereas the Chinese counterpart in (2) only contains an aspectual marker *zai*, rendering the sentence compatible with either a past or a present interpretation:

(1) Mary was studying.

(2) mali zai xue-xi
Mary PROG study
'Mary was/is studying.'

Such cross-linguistic variation brings up several interesting issues. This dissertation addresses the question of how different languages encode temporal relations, and how

such temporal information is processed during online language comprehension. Our key research questions are further spelt out and summarised as follows:

- How do English and Chinese differ in terms of temporal interpretations, given that one has overt tense marking and the other does not?
- Chinese is considered a superficially "tenseless" language, but does it have a covert tense? If so, is it sensitive to a Past/Non-Past distinction the way English is, or does it make a different kind of distinction, e.g. Future/Non-Future?
- What can the processing of temporal information tell us about the tense system in Chinese, and the processing of temporality in general?

The following paragraphs are dedicated to fleshing out the motivation of these questions in an integrative manner.

Linguistic literature on tense is enormous, but in general, tense is defined in syntactic and semantic terms. Dating back to Reichenbach (1971), the semantics of tense can be understood as situating event time in relation to speech time and reference time, although later theories have drifted away from representing tenses as configurations of temporal points in favour of a view that treats tense as the relation between temporal intervals (e.g. Dowty, 1979; Klein, 1994). Meanwhile, syntactic tense concerns a tense node in the syntactic structure of a language. We take the view that syntactic tense refers to a syntactic category, Tense Phrase, which usually – but not always – maps onto a corresponding semantic tense. In addition, following a research program initiated by Abney (1987) to examine more closely the grammatical parallels between NPs and VPs, recent cross-linguistic studies show that nominals can also explicitly encode temporal information. That is to say, while tense has traditionally been regarded as an inflectional category of verbs, nominals may also involve a Tense Phrase in their hierarchical structure, in a parallel fashion to verbal tense (Ilkhanipour, 2015; Lecarme, 2004; Nordlinger and Sadler, 2004a, 2004b). The focus of this dissertation is on (morpho-)syntactic tense in both nominal and verbal

domains, in particular how verbal tenses interact with temporal information in the nominals.

Syntactic tense may be realised covertly or overtly: overt tense is achieved via morphological marking, e.g. a tense morpheme, whereas covert tense is phonologically empty but still provides a feature-checking mechanism for tense features, such as [PAST] and [NONPAST]. This raises the question of whether languages like Chinese are "tenseless" only superficially: recall that in (2), the Chinese sentence contains no morphological marking of tense, nor does it seem to restrict the temporal interpretation to the past or the present (in relation to the time of utterance), but it remains unclear if a tense node needs to be assumed in order to account for these observations. Current theoretical discussions of the Chinese tense system largely focus on whether or not there is a covert past tense in Chinese, but arguments from both sides rely mainly on indirect evidence, such as whether there is a finiteness distinction in Chinese which is in fact neither sufficient nor necessary for a Tense Phrase (J. W. Lin, 2006, 2010; T. H. Lin, 2015; Sybesma, 2007). This leaves the debate about Chinese tenses fundamentally unsettled. In addition, although Chinese continues to be widely cited as a classic example of "tenseless" languages, recent research has shed new light on a third possibility: Chinese may possess a tense node with a Future/Non-Future distinction (Z. N. Huang, 2015; N. Li, 2016; Sun, 2014). This hypothesis calls for a re-analysis of a class of "tenseless" languages; a more fine-grained investigation of these languages is worth pursing as it has a broader bearing on certain fundamental issues, such as whether Tense Phrase is a universal syntactic category. The current study fits into the research agenda of identifying universal functional categories and the range of variation these categories allow for (Ritter and Wiltschko, 2014).

To engage with these discussions, we investigated the processing of tense in English and Chinese by looking at a particular linguistic phenomenon: lifetime effects. An individual-level predicate in the present or past tense triggers an inference about

the life or death of an individual (Arche, 2006; Husband, 2012; Jäger, 2001; Kratzer, 1995; Magri, 2009; Mittwoch, 2008; Musan, 1995, 1997; Roy, 2013; Thomas, 2012):

(3) Mary has blue eyes. $\rightsquigarrow$ Mary is alive

(4) John was from America. $\rightsquigarrow$ John is dead

In (3) and (4), verbal tenses interact with temporal information in the nominal subjects. Since as early as Anderson (1973), it has been widely observed that the use of tense in the above examples seems to locate the time of existence of the nominal subject; the life or death of an individual can be clearly inferred, depending on the particular choice of tense that is combined with an individual-level predicate.

More interestingly, Mittwoch (2008) observes that contradictory inferences arise when the subject NP denotes one living and one dead individual, as neither tense seems appropriate for the English copular *be*:

(5) Saussure$_{dead}$ and Chomsky$_{living}$ #are/??were linguists.

(6) This house was built for Bill Stevens, the actor, who died last year. The one over there belonged to his brother, John Stevens, the property tycoon; he now lives in America. They #are/??were both very handsome.

The phenomenon of contradictory lifetime inferences relate closely to the interaction of temporal information in the nominal and verbal domains. Additionally, it raises interesting questions with regards to what types of tense systems are available cross-linguistically. For example, do lifetime effects arise in "tenseless" languages like Chinese, where there is no overt marking of the past tense? Introspection tells us that the answer seems to be no:

(7) suoxuer shi yi-wei yuyanxuejia.
Saussure be one-CL linguist
'Saussure BE a linguist.' $\not\rightsquigarrow$ Saussure is alive/dead.

In (7), if the listener has no prior knowledge of Saussure, they cannot immediately infer whether he is alive or dead, but have to wait for follow-up context to fill in this piece of information. Furthermore, in (8) – the Chinese equivalent of (5) – no contradictory inferences seem to arise:

(8) suoxuer he qiaomusiji dou shi yuyanxuejia.
Saussure CONJ Chomsky both BE linguist
'Saussure and Chomsky both BE linguists.'

This judgement suggests that the Chinese copular *shi* is not sensitive to a Past/Non-Past distinction, contrary to the prediction made by theories that assume covert past tense (e.g. T. H. Lin, 2015).

Nevertheless, empirical evidence presented so far is insufficient to conclude that Chinese is completely "tenseless", since it remains possible that Chinese simply possesses a different tense system from the one in English, e.g. a Future/Non-Future distinction. In fact, the intuition in (8) can be equally accounted for by a non-future tense analysis of the bare copular, in line with the findings in Sun (2014) and Li (2016). This idea of non-future tense is further supported by our observation of "forward lifetime effects" in Chinese: when the subject involves one living and one yet-to-be-born individual, the bare copular *shi* cannot be used. For example, given the following context in (9):

(9) Holly, a British actress, will give birth to her first baby in New York. Her assistant, Georgia, had her baby in California last month.

the continuation of the discourse in (10) is infelicitous, suggesting that the Chinese bare copular – and probably bare predicates in general – may project a T node with the [NONFUTURE] value:

(10) ta-men de xiaohai dou #shi meiguo gongmin.
3PL POSS child both BE America citizen
'Their babies both #BE American citizens.'

Such speculations predict that the online processing of contradictory lifetime inferences may still involve extra cost via an "online update" process, despite the superficially "tenseless" structure of the language. It becomes self-evident at this point that offline judgements are not sufficient in addressing all the questions raised so far, since they fail to elucidate how the incremental representation of tense may disassociate with the final representation thereof, especially when such an asymmetry is anticipated based on theoretical grounds. How does the processing of lifetime information unfold over time, and how can it inform us of the process of discourse update during online comprehension? Questions like these motivate the need to probe into the online processing of lifetime effects.

Bearing all these questions in mind, we engage with theoretical discussions of tense and lifetime effects, taking a dynamic view of semantics which incorporates the incremental unfolding of discourse and sees sentential meanings as intimately interwoven with their influence on the context (Heim, 1982; Schwarz, 2014). This lays a theoretical foundation for the experimental work. The methodology that we have adopted includes two psycholinguistic techniques, namely acceptability judgement and self-paced reading, which are used to investigate the incremental update process during online language comprehension, and how it relates to or disassociates with the end product of language processing.

To this end, we present experimental evidence which shows that the Chinese copular *shi* has no Past/Non-Past distinction but a Future/Non-Future one, resulting in an asymmetrical judgement pattern for lifetime effects between English and Chinese. Previously, arguments for and against a tensed analysis of Chinese have relied on indirect evidence; the current study is the first to provide direct evidence which supports the view that there is a tense node in the syntax of Chinese. Moreover, mismatching lifetime information in the bare predicate sentences elicited reading time disruption in both languages, suggesting commonalities in addition to the

above-mentioned differences during online language comprehension. The lack of past tense marking in Chinese seems to nevertheless result in a degree of "hidden complexity" in the incremental processing of lifetime effects, parallel to that in English, suggesting that Chinese is unlikely to be completely "tenseless" but instead makes a Future/Non-Future distinction. Ultimately, we propose a model that involves an incremental update process during online language comprehension of temporal information. Sharing the flavour of Bittner's (2003, 2007a, 2007b) "online update" framework, our model bridges offline judgement results and online processing patterns in English and Chinese, and thus provides a framework for analysing the processing of tense cross-linguistically.

To recap, our key findings can be summarised as follows:

- While English speakers judge sentences with contradictory lifetime inferences as unacceptable, Chinese speakers do not find these sentences problematic when there is a bare predicate, suggesting that there is no covert past tense in Chinese.
- Results from the online processing of contradictory lifetime inferences show reading time disruption in both English and Chinese, suggesting that Chinese is unlikely to be entirely "tenseless" but may possess a tense node with a Future/Non-Future distinction, in line with many empirical observations.
- The processing of temporal information in both English and Chinese can be fully captured in a model that assumes an "online update" process.

In the spirit of these findings, we further suggest that Tense is a universal functional category that possesses a binary feature distinction, with a split between either Past/Non-Past or Future/Non-Future. All languages have a Tense Phrase in their hierarchical structure, although some languages lack overt marking of tense on nominals or verbs (or both). A new theory of tense is needed to account for the cross-linguistic variation on the surface form and the underlying homogeneity of temporal reference in language. The findings of this dissertation provide a new

perspective into the temporal interpretation of languages with distinct tense systems, contributing to a growing body of literature that takes an experimental approach to fundamental syntactic-semantic questions. We hope that this will allow new insights about Universal Grammar to shine through.

This dissertation is organised as follows: Chapter 2 provides a literature review on theories of tense and "tenseless" languages, and eventually engages with several influential accounts of lifetime effects. Chapter 3 presents methods and results from four experiments, two acceptability judgement studies followed by two self-paced reading studies in English and Chinese, which were designed to investigate the online and offline processing of lifetime effects in these two languages. Chapter 4 offers a general discussion, where we contextualise results from the current study with findings from previous research on Chinese tense and ultimately explain the data by proposing an incremental model with an "online update" process. Chapter 5 concludes and discusses some implications as well as future directions.

Chapter 2

Theoretical Background

Tense is the grammaticalisation of temporal relations. Languages vary with regards to how temporal information is expressed, as can be seen from the different types of tense systems that are available cross-linguistically. While the focus of the linguistic literature on tense has been on Indo-European languages such as English, recent research has witnessed an increasing interest in the so-called "tenseless" languages, which are said to have no tense marking at the morphological or syntactic level (Bittner, 2005; Bohnemeyer, 2009, 2014; C. T. J. Huang, 1998; Klein, 1994; J. W. Lin, 2006, 2010; Matthewson, 2006; Mucha, 2013; Shaer, 2003; Smith and Erbaugh, 2005; Tonhauser, 2010, 2011). In addition, while tense has traditionally been regarded as a category of verbs, recent studies suggest that nominals may also involve a Tense Phrase in their hierarchical structure (Ilkhanipour, 2015; Nordlinger and Sadler, 2004a, 2004b). Against this background, the current study answers the call of enhancing our understanding of time in language by considering the interaction between verbal tense and nominal temporality from a cross-linguistic perspective.

This chapter provides a literature review of issues related to temporal interpretation in language. Section 2.1 reviews the literature on the syntax and semantics of tense, with particular attention paid to the English tense system. Crucially, in

line with Kaufmann (2005) and Klecha (2016), we hold the view that the English tense is morpho-syntactically and semantically Past/Non-Past, rather than having a three-way distinction as traditionally assumed. Section 2.2 engages with the debate on Chinese as a "tenseless" language, bringing together arguments for or against a covert tense despite the lack of overt past tense marking. Ultimately, we show that Chinese does have a Tense Phrase, but it makes a Future/Non-Future distinction rather than a Past/Non-Past one. Section 2.3 discusses nominal temporality, the idea that nominals display temporal property that is not necessarily realised morphologically but interacts with temporal reference at the sentential level. Section 2.4 introduces the issue of lifetime effects, in which case the verbal tense influences the temporal interpretation of the nominal subject. We will also discuss some formal representations of (contradictory) lifetime inferences, based on which the hypothesis that lifetime effects do not arise in Chinese bare predicate sentences will be borne out. Finally, Section 2.5 briefly reviews several psycholinguistic studies of tense, and sets down some predictions about processing lifetime effects in English and Chinese.

2.1 Syntax and Semantics of Tense

Literature on tense and temporal interpretation is enormous. In this section, we aim to provide a sketch of the syntax and semantics of tense, with particular attention paid to the English tense system,[1]. Broadly speaking, we adopt a dynamic view of semantics, seeing sentential and discourse meanings as intimately interwoven with their influence on the context (Heim, 1982; Schwarz, 2014). Our general approach to theories of tense is in keeping with Declerck (1986), who focuses on the "temporal schemata that underlie the temporal meanings of the tenses" (p. 320).

[1]It must be noted that the locus of our discussion centres around *absolute tense* typically defined as the deictic property of tense which locates event time in relation to utterance time (Comrie, 1985; Levinson, 2008; Lyons, 1977). In addition, we will only discuss simple tense (i.e. past, present, and future tenses).

Tense can be defined in syntactic as well as semantic terms. Klein (1994) defines tense as "grammaticalised temporal relations" (p. 120), deictically denoting the relation between Utterance Time and Topic Time. Dating back to Reichenbach (1971), the semantics of tense can be understood as situating event time in relation to speech time and reference time. Semantic tense concerns either a past/future time operator used to navigate temporal references (Prior, 1967, 2003; Prior and Hasle, 2003), or the Reichenbachian relation between three time points (Comrie, 1985). Historically, tense was treated as an operator, as in a Priorian tense logic style, but subsequent work has adopted (and favoured) an alternative approach that analyses tense as establishing temporal relations by introducing several temporal points (Hornstein, 1993; Kamp and Reyle, 1993; Ludlow, 2006; Reichenbach, 1971). Meanwhile, syntactic tense concerns a tense node in a Tense Phrase in the syntactic structure of a language. We take side with the view that syntactic tense refers to a syntactic category, Tense Phrase, which usually – but not always – corresponds to semantic tense. Syntactic tense may be realised covertly or overtly: overt tense is achieved via morphological marking, e.g. a tense morpheme, whereas covert tense is phonologically empty but still provides a feature checking mechanisms for tense features such as [PAST] and [NONPAST]. In light of recent findings on the so-called "tenseless languages", whether or not Tense Phrase is universally available as a syntactic category has been under much debate. More specifically, in a language with no overt tense marking, it may still be possible or even necessary to assume covert tense in order to account for various temporal relations. We will return to this debate in our discussion of the Chinese tense system in Section 2.2.

Additionally, morpho-syntactic tense has traditionally been regarded as a grammatical (or to be more precise, inflectional) category of the verb. Binnick (1991, 2012), for example, describes tense as a grammatical category of the verb that may be realised morphologically by inflecting the verb or syntactically by adding an aux-

iliary (or both). However, this notion has been challenged by recent research that sheds light on the linguistic encoding of temporal information in the nominal domain (Lecarme, 2004; Nordlinger & Sadler, 2004a, 2004b; Sadler, Nordlinger, Butt, & King, 2001; Tonhauser, 2007), which suggests that nominals also have temporal properties that may or may not be explicitly encoded; we will return to this point in Section 2.3. But let's first look at the tense system in English.

2.1.1 Theories of Tense in English

Time is a one-dimensional linear continuum, and the way we talk about time largely follows this linearity. In theoretical linguistics, tense is also traditionally analysed as relational, denoting the relation between several temporal points or intervals (Dowty, 1979; Klein, 1994; Reichenbach, 1971). Upon this basis, subsequent work has developed an anaphoric notion of tense, conceptualising it as a temporal pronoun that denotes topic time and is anchored with certain temporal devices in the context (Kratzer, 1998; Matthewson, 2006; Partee, 1973).

Since as early as Reichenbach (1971), tense has been viewed as relational in nature. This view led to the influential E-R-S system, which aims to capture different tenses in language by referring to the relations between three parameters of time points, namely Event Time (E), Reference Time (R), and Speech Time (S). S is an deictic element anchored within the discourse, designated for the moment of speech. Within the E-R-S system, the relation between S and E constitutes the primary tense relation: the past tense is when E precedes S, the present tense is when the two temporal points are simultaneous, and the future tense is when S precedes E. This system is schematised in Figure 2.1, which illustrates the relation between three key parameters for each tense.

This approach is further developed in Comrie (1985), although he ultimately rejects Reichenbach's analysis based on the ground that the notion of Reference Time

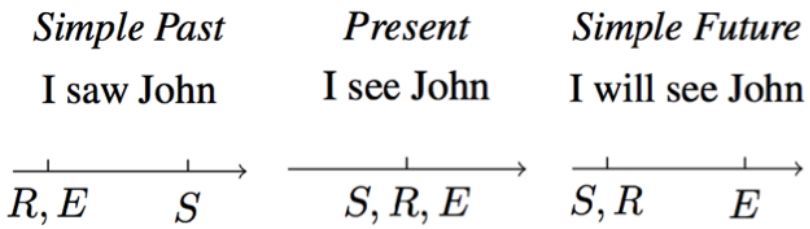

Figure 2.1: Reichenbach's E-R-S system

seems unnecessary for the characterisation of absolute tenses. Instead, Comrie (1985) proposes a different analysis in which simple tenses are distinguished by different relations between E and S. Crucially, in Comrie's (1985) analysis, E may either be a time point or an interval "occupied by the situation to be located in time" (p. 122). This system is superior to Reichenbach's in the sense that it abandons the representation of tenses as configurations of points in time and adopts the view that tenses denote temporal relations between points or intervals. Building on Reichenbach and Comrie's work, Declerck (1986) points out the deficiencies of previous systems and proposes yet another theory of tense, drawing more attention to the full or partial inclusion of time intervals. Further along this line of thinking, Klein (1994) proposes his innovation of Topic Time (TT), Time of Utterance (TU), and Time of Situation (TSit), which replaces the three reference points in "standard theories" with three temporal intervals. TT may be a very short interval, but it may also cover the full past/future, or be not restricted at all (Klein, 1994). In Klein's framework, tense denotes the relation between TT and TU, whereas aspect concerns the relation between TT and TSit; the past tense is defined as situating TT prior to TU (TT $<$ TU), and the present tense as TU contained in TT (TU $\subseteq$ TT). The development from viewing tense as relations between time points to relations between temporal intervals has led to fundamental changes in the description and analysis of cross-linguistic tenses.

Since the 1980s, theoretical linguists have been seeking an alternative analysis

that can not only capture temporal relations in a more elegant manner but also provide a more reliable *link* between the syntax and semantics of tense. This brings us to the prenominal tense theory, which conceptualises tense as a temporal pronoun that denotes topic time and is anchored with certain temporal devices in the context (Abusch, 1997; Bochnak, 2016; Heim, 1994; Kratzer, 1998; Partee, 1973, 1984, 1987). Following the prenominal tense theory, we further assume that in a Tense Phrase, there are two things that correspond to English tenses in a syntax tree: a temporal pronoun denoting the Topic Time, and a feature – [PAST] or [NONPAST] – which restricts the value of that pronoun.

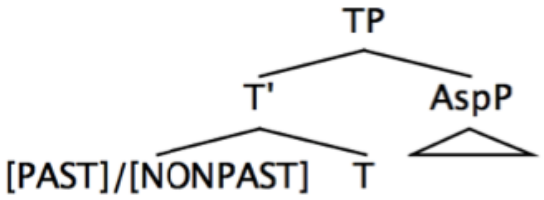

Figure 2.2: English tense system in prenominal tense theory

The choice of [PAST] and [NONPAST] for the English tense system is made based on distributional evidence. The unmarked English copular *is/are* is labelled as the present tense, although its use seems relatively more complicated than referring to the present time. The present tense is typically used for states or events that hold true *now*, which refers to a span of time including TU (Levinson, 2008). However, as Comrie (1985) puts it, "a more characteristic use of the present tense is referring to situations which occupy a much longer period of time than the present moment" (p. 37). Indeed, English *is/are* can be used for events in the present as well as (scheduled events) in the future; in other words, it is not necessarily restricted to *now*,[2] but

[2]There is controversy with regards to whether the English present tense exclusively marks the present time; many have offered detailed discussion of the occasional discrepancy in between tense and temporal reference (Langacker, 2001, 2011; Patard & Brisard, 2011). Classic examples include generic sentences such as *sugar dissolves in water*, and the *historical present*. Nevertheless, neither historical present nor generics goes against the prototypical value of the English present tense;

should be characterised as referring to *non-past* (Kaufmann, 2005; Klecha, 2016). For instance:

(11) a. The soccer match is today.

b. The soccer match is tomorrow.

c. The soccer match was/#is yesterday.

The non-past tense form *is* can be used for both present events (as in 11a) and future events (as in 11b), but it is incompatible with past events, as shown by (11c). Therefore, morphosyntactically – and semantically – the English tense system makes a Past/Non-Past distinction, whereas the future is expressed through the combination of the bare verb and some auxiliary (e.g. *will*) or other syntactic constructions (e.g. *be going to*).

On the other hand, a marked tense is semantically *not now*, which may be the past or the future. The marked tense copular in English, *was/were*, first makes a reference to a time interval that does not include NOW, which then specifies a past reference. Semantically, the temporal reference of the English marked tense can be schematised as follows:

(12) Marked tense = NOT NOW $\rightsquigarrow$ Past Tense in English

The English past tense is used to describe an event or a state that has ceased to exist in the present (Meyer-Viol & Jones, 2011), in relation to TU. Semantically, it possesses the feature [PAST] which restricts the value of the tense pronoun under a Tense Phrase of a finite clause.

This Past/Non-Past distinction that we have proposed for the English tense system is consistent with the notion of the "Basic Time Concept" (Klein, 1994, p. 61), as it displays the characteristics of segmentability (i.e. time can be divided into smaller

both uses are inherited from its default value of non-past. While we do acknowledge that there are non-canonical uses of the English present tense (Binnick, 1991; Klein, 2009), they are not in conflict with the Past/Non-Past generalisation.

segments), inclusion (i.e. time intervals may be in a full or partial inclusion relation), and linear order (i.e. time intervals that are not in an inclusion relation must be linearly ordered):

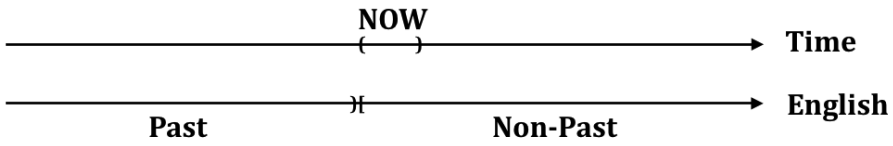

Figure 2.3: Past/Non-Past tense system in English

Thus, instead of viewing tense as the configuration of temporal points (e.g. TT, TU, TSit), we now consider it as the relation between intervals. We have proposed an interval NOW, which is an extended timespan that includes the moment of utterance time. NOW has two boundaries, at least one of which is grammatically encoded in a tensed language, leading to the division into an unmarked tense which includes the interval NOW, and a marked tense which expresses either the past or the future in a given language. We hold the view that English grammaticalises the left boundary of NOW, and the English present tense is semantically "not past". This view of the English tense inventory can also be found in Klecha (2016), who follows Kaufmann (2005) and argues that the present tense is "semantically non-past". The English copular *be* possesses a Past/Non-Past distinction, with the unmarked tense *is/are* bearing the feature [NONPAST] and the marked tense *was/were* bearing the feature [PAST].

2.1.2 A Word on Aspect

It is difficult to talk about tense without mentioning aspect. Indeed, these two notions are intimately related, but it is nevertheless possible (and in fact, necessary) to treat them separately and concentrate on each in our investigation (Hornstein, 1993). Literature on aspect uses the term to denote various meanings, most notably situation aspect (i.e. lexical aspects, aktionart) and viewpoint aspect (i.e. grammatical aspect).

Relating to our investigation of tense, we now discuss some temporal interpretation phenomena with reference to the viewpoint aspect.

A fundamental difference between tense and aspect is that tense is deictic while aspect is non-deictic (Klein, 1994). Comrie (1985) defines tense as the "grammaticalisation of location in time" and aspect as the "grammaticalisation of expression of internal temporal constituency" (p. 1). In other words, the viewpoint aspect specifies ways of viewing an event or a situation. One way of understanding viewpoint aspect is via the so-called perfective/imperfective distinction as two opposite ways of viewing the internal temporal constituency of an event (Comrie, 1976): the perfective aspect refers to viewing an event in its entirety, while the imperfective aspect concerns the internal structure of an event, focusing on part of the event typically without an endpoint. Formal definition of perfective and imperfective aspects will be provided in Section 2.2.2. Depending on the language under investigation, we may also speak of a neutral viewpoint aspect, which is flexible and includes the initial part of a situation and "at least one internal stage" (Smith, 1997, p. 6). The distinction between these viewpoint aspects becomes highly relevant when we discuss Chinese, which has no overt past tense marking but makes extensive use of the aspectual system for temporal references.

For the purpose of the current study, we are interested in how the aspectual system of a language interacts with tense to derive temporal interpretations. In Section 2.2, we will look at how aspect is used to guide temporal references in Chinese, a language without overt (past) tense marking.

2.2 Tenselessness

2.2.1 "Tenseless" Languages

This dissertation takes up the issue of temporal interpretations from a cross-linguistic perspective, and is ultimately concerned with the tense system in Chinese, traditionally known as a "tenseless" language (C. T. J. Huang, 1998; Klein, 1994; J. W. Lin, 2006, 2010; Smith & Erbaugh, 2005). But first, what does it mean for a language to be "tenseless"?

Typologically, the existence of tense marking seems to be negatively correlated with the richness of inflectional morphology, as stated in Greenberg's Universal #30 (Greenberg, 1966): "if the verb has categories of person-number or if it has categories of gender, it always has tense-mode categories." However, this implicational universal is quite controversial and has been challenged by Biak, an Austronesian language in Indonesia which has an elaborate inflectional system for person/number/gender but is said to lack TAM marking on the verb (Steinhauer, 1985). While expressions of time do seem to exist universally across all human languages, overt tense marking may not be universal.

Within this context, the term "tenseless" has been used in a number of different ways, resulting in some terminological confusion in the literature. One view states that a language can only be "tenseless" superficially, in the sense that underlying discourse tense – temporal location in general instead of grammaticalised location in time – can be said to exists universally since every language has its own way of expressing time. This view relies on a definition of tense that extends beyond its syntactic and semantic properties. An alternative and perhaps more widespread use of the term can be found in Smith (2008), who considers a language "tenseless" if there is no overt tense morpheme, pinning down the definition of "tenselessness" on the lack of morpho-phonological marking. Following this view, the existence of languages with

no morphological marking for tense challenges the empirical motivation for Tense as a functional category in the Principles and Parameters framework in its Minimalist incarnation (Ritter & Wiltschko, 2014). However, it is theoretically possible that tense is not morpho-phonologically realised, but a Tense Phrase still exists in the syntax of these languages. This notion of *covert tense* has triggered much theoretical debate with regard to the syntactic structure of "tenseless" languages and, more broadly speaking, the universality of Tense Phrase.

In this dissertation, we adopt the definition of tenselessness as lacking not only morphological tense, but also a Tense Phrase in the syntactic structure of a language. We take the position that the lack of an overt tense morpheme only makes a language superficially "tenseless"; a language is truly tenseless if there is no need to resort to covert features under a tense node, which would assume no tense feature checking mechanism in such languages. Tense is not universally realised in the inflectional morphology of verbs (Lyons, 1977), but for superficially "tenseless" languages, it may or may not be necessary to assume Tense as a functional category to account for various phenomena of temporal interpretations.

Superficially "tenseless" languages have attracted considerable attention in recent years. Apart from Chinese, formal analyses have been provided for at least the following languages: Blackfoot (Frantz, 1991), Halkomelem Salish (Wiltschko, 2003), Hausa (Mucha, 2013), Indonesian (Arka, 2011), Kalaallisut (alias West Greenlandic) (Bittner, 2005; Shaer, 2003), Malay (Svalberg, 1998), Paraguayan Guaraní (Tonhauser, 2006, 2010, 2011), St'át'imcets (Matthewson, 2006), Thai (Iwasaki & Ingkaphirom, 2005; Sudmuk, 2001), Vietnamese (Ngo, 2010; Thompson, 1965), and Yucatec Maya (Bohnemeyer, 2009, 2014). All of these languages are said to lack a true inflectional tense system, allowing aspectually unmarked sentences ("bare predicates" in the sense of Sun (2014)) to admit both past and present (and sometimes even future) readings. For example, in St'át'imcets (Matthewson, 2006, p. 676):

(13) táyt-kan.
hungry-1SG.SUBJ
'I was/am hungry.'

The sentence can be interpreted as either past or present, although future reference requires overt marking. Moreover, the temporal interpretation of this sentence can be narrowed down in a predictable way by adding a temporal adverbial:

(14) táyt-kan lhkúnsa.
hungry-1SG.SUBJ now
'I am hungry now.'

These are typical properties of temporal interpretation in superficially "tenseless" languages. In addition, many sign languages and creole languages are also frequently cited as classic examples of "tenselessness"; temporal references in these languages often make extensive use of aspectual systems as well as lexicalised temporal expressions (Xu, 1997). DeCaen (1995) provides a preliminary cross-linguistic survey, although this has become relatively outdated and invites input from more recent research.

It would be unrealistic to treat "tensed" and "tenseless" as a dichotomy since tense, like many other linguistic categories, can be at different degrees of grammaticalisation in different languages. Smith (2008) has a brief discussion of "mixed-temporal" languages, including Navajo (Smith, Perkins, & Fernald, 2007), Hua (Haiman, 1980), and Hopi (Malotki, 1983), which she describes as distinguishing from both tensed and "tenseless" languages, although the latter two have also been analysed as having a non-future tense. Plungian and van der Auwera (2006) also comment on several languages in which reference to the past is morphologically marked only optionally. More recently, Bochnak (2016) presents a novel analysis of Washo as a language with optional tense (i.e. *graded tense* according to Mucha (2017)), defying the commonly-held dichotomy between tensed and "tenseless" languages and thus offering a new perspective on the syntax and semantics of tense at different stages of grammaticalisation. We will not go into the details of these temporal systems here due to space

limits, but in the interest of future research, a concise summary of the basic properties of five "tenseless" languages is provided in Appendix I.

In a nutshell, "tenseless" languages lack overt morphological marking of tense, and in these languages, aspectually unmarked, bare predicate sentences typically admit both past and present readings. Under a pronominal tense analysis, such sentences seem to lack a tense feature that restrict "the value of a temporal pronoun" (Bochnak, 2016, p. 277). However, it remains a question whether these languages simply lack tense altogether, or whether they possess a tense system that is typologically different from the Past/Non-Past distinction commonly found in Indo-European languages.

2.2.2 Chinese: Covert Past Tense, Tenseless, or Neither?

It is widely acknowledged that Chinese lacks overt marking of (past) tense in its inflectional morphology (C. T. J. Huang, 1998; Klein, 1994; Klein, Li, & Hendriks, 2000; J. W. Lin, 2003, 2006, 2010, 2012; Smith & Erbaugh, 2005). There is general consensus that with the bare copular *shi*, both past and present readings are available, although a future interpretation is excluded:

(15) mali shi yi-ge hao ren.
Mary BE one-CL good person
'Mary was/is a good person.'

In this example, the future reading "Mary will become a good person" is unavailable, and the sentence is incompatible with a future adverbial such as "ten years later". Klein (1994) notes that Chinese seems to have "no grammaticalised means to restrict TT to some particular time span in relation to TU" (p. 124). Instead, the language makes extensive use of an aspectual system to derive various temporal interpretations. This leads J. W. Lin (2006) to argue that not only does Chinese have no morphological tenses, but there is "no need to resort to covert features under an

empty tense node" in the syntax of Chinese (p. 49). Instead, the language is said to employ four main strategies in making temporal references: temporal adverbials, aspectual markers, default viewpoint aspect, and pragmatic reasoning (J. W. Lin, 2006). We will elaborate on the first three strategies in the following paragraphs.

Temporal adverbials in Chinese can provide temporal reference in relation to TU, although they are often used in conjunction with aspectual markers. Here is an example from J. W. Lin (2006, p. 3):

(16) Zhangsan zuotian qu le ni jia.
Zhangsan yesterday go ASP you house
'Zhangsan went to your house yesterday.'

Zuotian 'yesterday' specifies the TT, i.e. time of the event of 'going to your house', although being entirely optional, the adverbial itself does not determine the relation between the temporal interval they indicate and that of the event they modify. Another adverbial that typically gives rise to a past time reading is *ceng* or *cengjing* 'once'. Typically preceding the verb, *ceng* is used to indicate that an event once happened or a state once held (Qiu & Zhou, 2012; Xiao & McEnery, 2004):

(17) ta (ceng) you guo yi-duan hunyin.
3PL (once) have PERF one-CL marriage
'He/She (once) had a marriage (i.e. He/She was once married.)'

But again this optional adverbial is not responsible for specifying the relation between TT and TU, and thus does not qualify as a past tense morpheme.

Aspectual markers are used very frequently to provide temporal references in Chinese (Xiao & McEnery, 2004). There are four key aspectual markers: (i) *zai*, a progressive marker which indicates imperfectivity and can only modify a dynamic durative event (as in 18a); (ii) *zhe*, a durative marker which also indicates imperfectivity and can only occur with atelic eventualities[3] (as in 18b); (iii) *guo*, a perfective marker;

[3]Smith (1997), quoting Yeh (1990), claims that *zhe* does not occur with individual-level predicates; however:

and (iv) *le*, which is the most complex one and is sometimes analysed as having dual functions of indicating perfectivity or imperfectivity in different contexts, depending on its syntactic position (C. N. Li, Thompson, & Thompson, 1982; Rohsenow, 1977), although recent research suggests that it should be analysed as a "realisation operator" which realises the initial part of an event, leaving the perfectivity of the entire VP dependent on whether or not the event has an inherent endpoint (Klein et al., 2000; J. W. Lin, 2000; T. H. Lin, 2015). The difference between *le* and *guo* is illustrated by the contrast between (18c) and (18d):

(18) a. Lisi zai xi-zao
Lisi PROG take-bath
'Lisi is taking a bath.'

b. Lisi liu-zhe yi-tou chang fa
Lisi wear-DUR one-CL long hair
'Lisi keeps long hair.'

c. Lisi die-duan-guo zuo tui
Lisi fall-broken-PERF left leg
'Lisi broke his left leg before.' (and he has already recovered)

d. Lisi die-duan-le zuo tui
Lisi fall-broken-ASP left leg
'Lisi has broken his left leg.' (and he has not recovered yet)

According to J. W. Lin (2006), these aspectual markers "play the same role that tense plays" in a tensed language like English (p. 49), precisely because of a set of rules that fall under the term *default viewpoint aspect*.

Temporal interpretation in Chinese relies heavily on the notion of *default viewpoint aspect*: by default, a sentence with the imperfective viewpoint aspect gets a present interpretation, while the perfective viewpoint aspect maps onto a past inter-

(i) Ta you-zhe yi-shuang lan yanjing.
3SG have-DUR one-CL blue eye
'(S)he has a pair of blue eyes.'

As shown in this example, *-zhe* can occur with *you* 'have'/'possess' to express a temporal persistent property such as 'have blue eyes', which is undoubtedly individual-level.

pretation. J. W. Lin (2003, 2006) first adopts Bohnemeyer and Swift's (2004, p. 286) formal definition of aspects, and then further revises the definition of perfective aspect for Chinese as follows, adding a precedence relation between topic time and evaluation time (i.e. utterance time in an out-to-the-blue context) to represent this default interpretation rule:

(19) Perfective aspect = $\lambda P_{<i,t>}\ \lambda t_{Top}\ \lambda t_0\ \exists\ t\ [t \subseteq t_{Top} \wedge t_{Top} < t_0 \wedge P(t)]$

(20) Imperfective aspect = $\lambda P_{<i,t>}\ \lambda t_{Top}\ \exists\ t\ [t_{Top} \subseteq t \wedge P(t)]$

where t_{Top} is a subset of the situation time *t*. Following C. J. Tang (1990), J. W. Lin (2006) proposes the following phrase structure for Chinese:

(21) [CP . . . [IP . . . [ModalP ... [AspP ... [VP ...]]]]]

Based on these arguments, he concludes that temporal interpretation in Chinese can be fully accounted for in the absence of tense features under a syntactic tense node.

In addition to J. W. Lin's tenseless analysis, Smith (2008) also argues that tensed languages have a Tense Phrase in syntax while "tenseless" languages only have a syntactic Aspect Phrase; under this view, Tense Phrase is not universal, and syntactically Chinese is truly tenseless. To account for the universality of temporal interpretations across both tensed and "tenseless" languages, she proposes two pragmatic principles: (i) Present as Default, which states that the default interpretation of bare sentences are located in present time; (ii) Bounded Event Constraint, which says that aspectual information about boundedness determines that bounded events cannot be located at TU, guiding speakers' inference toward a past interpretation of a given event. Smith (2008) claims that the temporal interpretation of past events can be fully accounted for by a series of pragmatic reasoning principles, which weakens the alternative possibility that Chinese has an empty tense node.

However, arguments in favour of the tenseless analysis are unsatisfactory as

they essentially rely on the claim that a tense node is *unnecessary*; no empirical evidence has been raised *against* the covert tense analysis. Whether Chinese should be analysed as truly tenseless or not remains an unsettled debate. Notably, Sybesma (2007) challenges the tenseless analysis by showing some parallelism between Dutch and Chinese: to obtain a past time interpretation, (22b) and (23b) both require agreement between a past temporal adverbial and a tense morpheme in Dutch, or a null tense morpheme in Chinese:

(22) a. #Ik woonde in Rotterdam.
1SG live.PAST in Rotterdam
'I lived in Rotterdam.' (infelicitous in isolation)

b. Ik woonde in 1989 in Rotterdam.
1SG live.PAST in 1989 in Rotterdam
'I lived in Rotterdam in 1989.

(23) a. Wo zhu zai Lutedan.
1SG live in Rotterdam
Intended: 'I lived in Rotterdam.' (infelicitous in isolation)

b. Wo 1989 nian zhu zai Lutedan.
1SG 1989 year live in Rotterdam
'I lived in Rotterdam in 1989.'

Based on these observations, Sybesma (2007) argues that the tense node is a mere agreement morpheme, agreeing with temporal adverbs. As far as temporal interpretation is concerned, we have two problems with this analysis. First, in Sybesma's proposal, it is unclear what exactly is the feature of the tense node, if it is not a temporal one. Second, there is indeed parallelism between the Dutch and Chinese sentences in the sense that a temporal adverbial is required to obtain past time reading in (22b) and (23b), but Sybesma fails to point out a crucial difference between (22a) and (23a): the Dutch sentence is infelicitous due to the lack of agreement with a temporal adverbial in the sentence, but the Chinese sentence is completely grammatical on its own, with its meaning reserved for a present time interpretation as

dictated by the *default viewpoint rule*; the past tense reading is not enabled unless a past context is provided to override this default. Thus, it seems to be the case that the past tense morpheme in Dutch requires agreement with a past adverbial, but because Chinese has no past tense morpheme, aspectually unmarked sentences get a present time reading by default unless they are explicitly marked by a past adverbial. This alternative explanation is still compatible with the hypothesis that Chinese has no covert past tense.

In response to Sybesma's argument, J. W. Lin (2010) defends his tenseless analysis by claiming that (i) not every theory of temporal interpretation relies on the existence of a syntactic tense node, and Tense Phrase is not universally present in every language; (ii) there is "empirical argument" for the lack of tense in Chinese: syntactic properties of Chinese, such as the lack of a copular in constructions with a nominal predicate, the lack of subject expletives, possible lack of the Finite/Non-Finite distinction, and possible lack of case-driven movement, are all consequences of the absence of a T node. These arguments, however, suffer from serious logical fallacies: the assumption in (i) relies essentially on the conclusion he draws, so the argument in fact runs into circularity; regarding (ii), the presence of these properties are not defining properties of a T node to begin with, so the lack thereof doesn't entail the lack of a T node. In other words, his follow-up arguments also do not provide direct evidence against the covert tense analysis.

In fact, T. H. Lin (2015) also points out similar problems and further contests that the lack of a copular in nominal predicate sentences is "not evidence for or against tense in Chinese" (p. 321). He argues against J. W. Lin's (2010) view that there is no need for tense simply because temporal reference can be made available through aspects, pointing out that this is not good evidence against a tense node in Chinese, because aspectual properties in English also have a direct consequence on temporal interpretations. Furthermore, T. H. Lin (2011, 2012, 2015) demonstrates that there is

indeed a Finite/Non-finite contrast in the clausal complements of modals in Chinese, which makes object fronting possible only if it is from a finite clause (as in 24a), but impossible if it is from a non-finite clause (as in 24b):

(24) a. Zhangsan hanbaoi chi e_i le.
Zhangsan hamburger eat ASP
'Zhangsan has eaten the hamburger.'

b. #Zhangsan yaoqiu [Lisi hanbaoi chi e_i].
Zhangsan ask [Lisi hamburger eat
Intended: 'Zhangsan asked Lisi to eat the hamburger.'

This shows that object fronting in Chinese is sensitive to the finiteness property of the clause, which, according to T. H. Lin, may come directly from a tense node, although he did not commit to the correlation between these two syntactic properties. Further support for a finiteness distinction in Chinese can be found in Ansaldo et al (2015), who show in an fMRI study that non-finite clauses activated significantly more areas involved in semantic processing than finite clauses, even though the structure of these two types of clauses are superficially identical. We take side with the view that there is sufficient evidence for a finiteness distinction in Chinese, but this does not necessarily entail a T node, and it is certainly no strong evidence for covert past tense. O'Neill (2015), for example, argues that the copular can associate with Tense or directly with finiteness, so finiteness doesn't entail a T node;[4] she further demonstrates that even in a tensed language like English, finite clauses can "lack the projection of T", contrary to the mainstream view of clause structure which states that higher structural domain (e.g. finite CP) entails lower ones (e.g. TP) (Adger, 2007; Rizzi, 1997).

Whether or not Chinese has the finiteness property is an issue that merits separate attention (T. C. Tang, 2000), but in short, there is mounting evidence in favour of a finiteness distinction in this language. Nevertheless, the finiteness property

[4]In fact, Grano (2014) and Hu, Pan and Xu (2001) have offered detailed arguments against such a correlation in Chinese, and demonstrate that control can be achieved without even needing a finiteness contrast, although these arguments already presuppose that there is no T node in Chinese. The correlation between finiteness and a T node is a separate ongoing debate.

does not entail the existence of a T node; nor does it inform us of the specific tense system that Chinese may possess. While the tenseless analysis remains unsatisfactory, empirical evidence in support of a covert past tense is still rather scarce, leaving the debate about Chinese tense fundamentally unsettled.

2.2.3 (Non-)Future Tense in Chinese: A Third Possibility

While the focus of our discussion (and of previous work) is on a Past/Non-Past distinction in Tense Phrase, it is theoretically possible that Chinese simply has a different tense system: it makes a Future/Non-Future distinction but draws no boundary between the past and the temporal interval NOW. This view has been gaining more and more attention, with emerging evidence showing that future reference in Chinese requires an overt expression indicating a future time (J. W. Lin, 2003), which, unfortunately, cannot be borne out from J. W. Lin's tenseless proposal but must be independently stimulated. Z. N. Huang (2015) recently proposes a tensed analysis of Chinese with evidence from *jiang*, which he takes as a future tense morpheme that alternates with a zero non-future morpheme. His theoretical arguments largely build on the distribution and syntactic properties of *jiang*, which we will elaborate on a bit more.

To begin with, Z. N. Huang (2015) points out that *jiang* always precedes modal auxiliaries like *hui* and *yao* when expressing future time reference.[5] Taking linear precedence as a reflection of structural height, he argues that this suggests *jiang* is structurally higher than auxiliaries:

(25) Lisi jiang hui qu Beijing.
Lisi JIANG HUI go Beijing
'Lisi will go to Beijing.'

Note that reversing the order of *jiang* and *hui* in (25) leads to ungrammaticality.

[5]See Wu & Kuo (2010) for the semantics of *jiang*, *yao*, and *hui*.

However, as Z. N. Huang correctly reasons, this does not rule out the possibilities that *jiang* is an auxiliary (just like *hui*), a time adverb, or an irrealis mood. To address these issues, he further provides distributional evidence which pins down *jiang* as a promising candidate for future tense morpheme: *jiang* behaves differently from auxiliaries in prohibiting V-not-V question (e.g. *hui-bu-hui*, but *#jiang-bu-jiang*) and not licensing VP ellipsis; it is not a future adverb since it cannot appear sentence-initially or in imperatives; nor is it an irrealis mood marker since it cannot appear in yes-no questions or conditionals about past events, which are typically non-future irrealis contexts. Based on these observations, Z. N. Huang proposes that *jiang* is a future tense morpheme, which makes two correct predictions: it requires a verb host (as in 26), and there is indeed a finiteness distinction in Chinese clauses (in line with T. H. Lin (2011, 2012, 2015), as shown by the contrast between 27a and 27b):

(26) Mingtian jiang #(shi) xingqiyi.
tomorrow JIANG be Monday
'Tomorrow will be Monday.'

(27) a. Tamen renwei Lisi mingtian jiang qu meiguo.
they think Lisi tomorrow JIANG go America
'They think that Lisi will go to America tomorrow.'

b. Tamen yao Lisi mingtian #jiang qu meiguo.
they want Lisi tomorrow JIANG go America
'They want Lisi to go to America tomorrow.'

Upon revision, Z. N. Huang proposes the following phrase structure for Chinese clauses, *pace* J. W. Lin (2006):

(28) C [... T [... Neg1 [... Auxiliary [... Neg2 [... Aspect [...VP

This idea of assuming a future tense morpheme largely follows Matthewson's (2006) analysis on St'át'imcets, which involves a tense morpheme that is able to account for the absence of future readings in aspectually unmarked sentences "by means of a presupposition restricting the reference time to non-future values" (p. 699).

Additionally, Li (2016) proposes that Tense Phrase in Chinese is realised in *you* 'have/possess' which bears the [NONFUTURE] value in negative sentences with the negation marker *mei*. In the following example:

(29) Zhangsan meiyou piping (#le) Lisi.
Zhangsan NEG-have criticize ASP Lisi
'Zhangsan did not criticize Lisi.'

The fact that the perfective aspectual marker *le* in the affirmative sentence cannot occur in its negated counterpart raises the question of where the temporal information of this sentence comes from,[6] and therefore challenges a tenseless theory of Chinese. Based on further distributional evidence, Li concludes that *le* and *meiyou* are not in complementary distribution, and thus cannot possibly be both under the same AspP; instead, *meiyou* seems to be structurally higher than many aspectual markers, but lower than ModalP headed by *hui*:

(30) [...[$_{?}$ [$_{?}$ meiyou] [$_{AspP}$ [$_{AspP}$ le/guo/zai/zhe] [$_{vP}$ ...]]]]

Ultimately, Li argues that *you* heads the Tense Phrase and denotes non-future tenses.[7]

This view is also largely shared by Sun (2014), who argues that Chinese has a morphologically null tense, NONFUT, which "restricts the temporal reference of bare root clauses to non-future times" (p. 10). Sun (2014) shows that stative sentences with a bare predicate in Chinese can be used to "describe plural eventualities with more than one temporal location" (p. 205), allowing simultaneous past and present readings:

[6]Note, however, this sentence is perfectly grammatical if we change *le* to *guo*:

(i) Zhangsan meiyou piping guo Lisi.
Zhangsan NEG-have criticize PERF Lisi
'Zhangsan has never criticize Lisi.'

We suspect that this is due to the interaction between the negation marker and aspectual properties of *le*/*guo*, but we will leave this puzzle for future research.

[7]However, she also points out that her T node proposal applies only to particular sentence types, i.e. episodic eventive or Davidsonian state sentences.

(31) niudun he huojin dou dui wuli ganxingqu
Newton and Hawking both to physics interest
'Newton and Hawking both BE interested in physics.'

(32) zuotian he jintian lulu dou hen jusang
yesterday CONJ today Lulu both very frustrated
'Lulu BE frustrated both yesterday and today.'

Although she does not use the term "lifetime effects", these examples show that the evidence for Non-Future tense is not restricted to *you* and the bare copular *shi*, but can also be extended to other types of bare predicates, including non-verbal ones.

Further along this line of argument, we observe the so-called "forward lifetime effects" (Arche, 2006) with contradictory inferences in Chinese, suggesting that a completely tenseless theory of Chinese is unlikely to hold. In the following English example:

(33) Holly, a British actress, will give birth to her first baby in New York. Her assistant, Georgia, had her baby in California last month. Both of their babies #are/#will be American citizens.

In the third sentence, both the present tense copular and the future-reference modal result in infelicity in English. More interestingly, this example is equally infelicitous in Chinese with the bare copular *shi*:

(34) ta-men de xiaohai dou #shi meiguo gongmin
3PL POSS child both BE America citizen
'Their babies both #BE American citizens.'

This suggests that shows that *shi* may project a T node with the [NONFUTURE] value, excluding a future reference when appearing in aspectually unmarked sentences. Such reasoning provides further arguments for the view that Chinese has a phonologically null non-future tense.

Therefore, taking together all the empirical observations discussed above, we

take the position that there is a Future/Non-Future tense distinction in Chinese (as illustrated in Figure 2.4), where a tense node with a [NONFUTURE] feature underlies the superficially "tenseless" bare predicates such as *you* and *shi*.

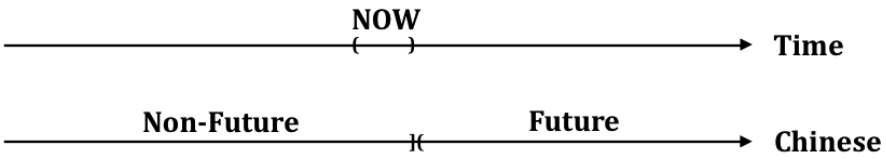

Figure 2.4: Future/Non-Future tense system in Chinese

The hypothesis of a Future/Non-Future tense distinction in Chinese calls for a re-analysis of a class of "tenseless" languages, as it questions whether such a homogeneous class actually exists. One implication is that some of these languages may resemble Chinese in having a Future/Non-Future distinction, while the others could be truly tenseless. An even stronger implication says that all superficially "tenseless" languages actually possess a Future/Non-Future distinction. A more fine-grained investigation of this class of languages has an even broader bearing on fundamental issues, such as whether Tense Phrase is a universal syntactic category. The current study now finds itself in a position to propose a new typology of tense: in languages of the world, the unmarked tense includes the interval NOW while the marked tense is semantically ¬NOW 'not now', which may specify either a past or a future reference. This specification is subject to cross-linguistic variation. Morphosyntactically, languages typically have a binary tense systems, with a split between either Past/Non-Past or Future/Non-Future.[8] The Tense Phrase exists universally in the hierarchical structure of all languages, as part of the finite set of fundamental principles provided by Universal Grammar to enable the acquisition of temporal references in language. This sets up a new agenda for future research in the direction of a typological study

[8]We take side with the view that the time reference of each tense must be "a continuity" (Comrie, 1985, p. 50), so Present/Non-Present is not a possible tense system as the Non-Present tense would denote two intervals interrupted by NOW. A three-way split may exist, although we will not pursue this possibility any further here.

of tense in languages of the world.

2.3 Nominal Temporality

Abney's (1987) seminal work on the English NPs points out a striking parallelism between functional projections that dominate nouns and verbs. It has been long known that nominals can bear temporal information, which presumably also carry semantic features such as [PAST] or [NONFUTURE] (Enç, 1987; Musan, 1995; Thomas, 2012, 2014; Tonhauser, 2000; Wiltschko, 2003). More broadly speaking, Klein (1994) acknowledges the "implicit temporalisation of noun phrases" whose interpretation is dependent on various factors, such as world knowledge and contextual time frame (p. 224). NPs can be temporalised mainly in two ways: particles in attributive uses (as in 35) which are directly linked to TT but not TU, and the head of an NP (as in 36) (Klein, 1994).

(35) The dancing panda / the boiling water / the barking dog

(36) When my father was little, he broke his arms.

However, in these cases, the temporality of the NP is not overtly encoded on the English nominal itself.

While tense is traditionally regarded as a syntactic category of the verb, recent research has shed light on the notion of *nominal tense*, the linguistic encoding of temporal properties on NPs, which is much less understood compared to verbal tenses. Common nouns and pronouns may be interpreted temporally, as empirically shown by languages that explicitly encode temporal information on nominal elements, suggesting that tense can be analysed as a possible inflectional category for nouns as well as verbs. Nordlinger and Sadler (2004a, 2004b, 2008) in a series of papers have provided a comprehensive cross-linguistic investigation of nominal tense. Notably,

they point out that tenses in nominal and verbal domains are syntactically as well as semantically independent of each other since they are not necessarily in an agreement relation; nor do they even have to be compatible. Nominals can sometimes escape the scope of sentential tense operator, contrary to the traditional assumption that (verbal/sentential) tense affects the interpretation of all expression in its scope. This is referred to as "nominal tense within nominal scope" (Sadler et al., 2001, p. 434), and it motivates the treatment of time variable within nominal expressions, on a par with verbal tenses (Enç, 1987; Lecarme, 2004).

The notion of having a time variable in nominals has been around for several decades, and many have taken a referential approach which allows nominal arguments to be independently temporally located (Enç, 1987; Musan, 1995; Tonhauser, 2000). Enç (1987), for example, terms such temporally-anchored expressions as temporal NPs that carry the feature [+TEMP], which can be independently located from TAM markings on the verb. Further along this line, Tonhauser (2000) adopts a dynamic semantics framework and distinguishes two different types of nominal predicates: "temporary property nouns" such as *student* or *refugee*, and "inherent property nouns" such as *girl* or *cat*; the latter can be considered the nominal counterpart of individual-level predicates. To formally represent temporal information of inherent property nouns, Tonhauser introduces a lifetime function **lt(x, t')** which takes two arguments, with the first identifying an individual and the second being a list that contains the interval during which the individual is alive. The lifetime function expresses a relation between an individual x and the interval t' during which the individual has a lifetime. Such a relation turns out to be illuminating for our thinking on lifetime effects, which we will focus on in the next section.

While the majority of work on temporal location of NPs has focused on English, Lecarme (1996, 1999, 2004) shows that Somali DPs provide examples of the nominal equivalent of verbal tense. In (37) and (38), the *-ii* suffix on NPs expresses the

[+PAST] feature, in parallel to the [+/−PAST] opposition in verbal tenses:

(37) qabqabashá-d*ii* shálay
arrests-detF[+PAST] yesterday
'Yesterday's arrests.'

(38) Árday-g*ii* wúu wanaagsan*aa*
student-detM[+PAST] F.3MS good[+PAST]
'The student was good (on Monday).'

Note that in this example, the nominals *qabqabashá-dii* and *árday-gíi* bear the feature [+PAST], but the latter does not trigger lifetime effects as it is merely in agreement with the stage-level predicate. Under the assumption that tense is realised in D, Lecarme (2004, p. 445) claims that nominal and verbal tense and agreement are "in a parallel fashion", in line with Enç (1987). She further proposes the temporal structure of nominal phrases, in parallel to that of CP:

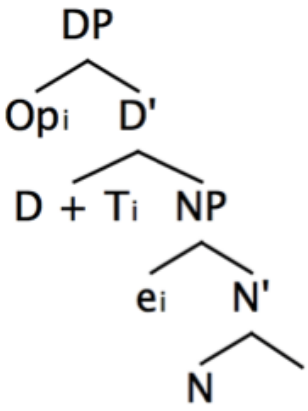

Figure 2.5: Temporal structure of nominal phrases

where T_i represents the Reference Time and e_i the Event Time, both of which are within the hierarchical structure of the DP such that a bare noun is interpreted temporally with reference to features represented on the tree. She ultimately argues that in Somali, DPs and argument CPs have the same distribution due to the T node being attracted in D (i.e. T-to-D[9]), an analysis for nominal tense which she takes

[9]Pesetsky and Torrego (2001) treat the T features of DP as a strictly uninterpretable feature, which

as an LF-external, "constructed interpretive device" that is language-independent (Lecarme, 2004, p. 441). Based on this, Lecarme further argues that this property of expressing temporal feature in nominal phrases must be universally available in all languages, as it has been demonstrated in "tenseless" languages where the processes of temporal encoding are not explicit (Lecarme, 2004).[10]

Building on these previous works of nominal tense, Ilkhanipour (2015) further proposes a structural hierarchy for DP:

(39) [Assert$_N$P [Mod$_{N.epis}$P [T$_N$P [Mod$_{N.root}$P [NP ...

where there is a nominal Tense Phrase, T$_N$P, and nominal tense is the time of the existence or occurrence of the modified noun. To support this proposal, she provides evidence from Persian where the ambiguity of the adjective *qæbli* 'previous' can be explained by the different syntactic position it takes up in the DP:

(40) bærænde-ye qæbli
winner-EZ previous
'The previous winner'

There are two possible interpretations in (40): the first one says that this "previous winner" no longer holds the prize, in which case *qæbli* is the specifier of T$_N$P, thus making the property of being the winner in the past; the second reading arises when there are two winners and one of them was "previously mentioned", in which case *qæbli* is the specifier of ordinalP as it simply plays the role of an ordinal number that puts an order between two (simultaneous) winners. The two different syntactic positions of *qæbli* lead to different temporal interpretations of the head noun.

makes no semantic contribution in their framework but only plays a role in triggering syntactic processes, e.g. movement. However, they do observe that DPs can be temporally situated. For a detailed discussion, see Nordlinger and Sadler (2004b).

[10]For recent descriptive work on other languages with nominal tense, see Demirdache (1997) on St'át'imcets; Hale (1998) on Pittapitta; Nordlinger and Sadler (2004a, 2004b) and Sadler et al (2008) on Tariana, Halkomelem, and Hixkaryana; Thomas (2012, 2014) on Mbyá; Wurm and Hercus (1976) on Gurnu.

The structural hierarchy of DP is in parallel to its counterpart at the sentential level, in the spirit of Abney's (1987) remarkable insight and in line with abundant empirical evidence from languages with nominal tense (Lecarme, 1996, 1999, 2004; Nordlinger & Sadler, 2004a, 2004b, 2008). All of these findings on the structure of nominal tense invite the hypothesis that a nominal Tense Phrase carries temporal features, such as [PAST] or [NONPAST], just like its verbal counterpart. We will further elaborate on this point in our discussion of lifetime effects in the next section.

In short, theoretical work on temporalised NPs and nominal tense points toward the possibility that nominal temporality may play a role during online language comprehension. Following this proposal, we now turn to a close examination of lifetime effects, where verbal tenses interact with temporal information in the nominals.

2.4 Lifetime Effects

2.4.1 Lifetime Effects: An Overview

Individual-level predicates (henceforth ILPs) like *have blue eyes* or *be from America* denote permanent properties which are required to hold over the lifetime of individual(s) in the subject position. Since as early as Anderson (1973), it has been widely observed that the use of tense in (41) and (42) seems to locate the time of existence of the nominal subject with an ILP;[11] the life or death of an individual can be clearly inferred, depending on the choice of verb tense:

(41) John was from America. $\rightsquigarrow$ John is dead

[11] By contrast, these inferences do not seem to occur with stage-level predicates (henceforth SLPs), which express transient, temporary properties:

(i) John was available/absent/sick.

In (i), no lifetime inferences can be drawn.

(42) Mary has blue eyes. ⇝ Mary is alive

In a tensed language like English, an individual-level predicate in the present or past tense triggers an inference about the life or death of an individual; this is termed *lifetime effects* (Arche, 2006; Husband, 2012; Jäger, 2001; Kratzer, 1995; Magri, 2009; Mittwoch, 2008; Musan, 1995, 1997; Roy, 2013; Thomas, 2012). The same phenomenon has been observed in languages other than English,[12] such as French (Roy, 2013, p. 65):

(43) Paul était françis/généreux/chauve.
Paul be.PAST French/generous/bald
'Paul was French/generous/bald.' ⇝ Paul is dead

More interestingly, contradictory inferences arise when the subject NP denotes one living and one dead individual (Mittwoch, 2008), as neither tense seems appropriate for the English copular *be*:

(44) Saussure$_{dead}$ and Chomsky$_{living}$ #are/??were linguists.

In the above example, contradictory inferences arise: either present tense or past tense would lead to an incorrect inference about one of the individuals in the subject position. The issue of lifetime effects has only been discussed theoretically with reference to native speaker intuition, with most of the discussion focusing on lifetime inferences from the past tense (i.e. inferring that someone is dead) as it is considered more "dramatic" or "newsworthy". It is reasonable to speculate whether lifetime inferences from two tenses are actually be on a par, and if that is not the case, one may wonder what implications can be borne out with regards to the processing of temporal information.

Why does the use of English present or past tense trigger lifetime effects? What conditions the arise of these inferences? Discussions concerning these questions first

[12]See also: Diesing (1992) on German, Doherty (1996) on Irish, Kratzer (1995) on German, Kuroda (2012) on Japanese, Willie (2000) on Navajo, and Sasse (1987) on various other languages.

resort to the distinction between ILPs and SLPs, which we will turn to immediately.

2.4.2 Individual-Level Predicates vs. Stage-Level Predicates

Lifetime effects have been widely used as a diagnostic test for the distinction between ILPs and SLPs. Milsark (1974) and Carlson (1977) are among the earliest to point out the ILP/SLP distinction; ever since then, much work has been generated on the basis of this distinction (Chierchia, 1995; Condoravdi, 1992; Diesing, 1992; Fernald, 2000; de Hoop and de Swart, 1990; Jäger, 2001; Kratzer, 1995; McNally, 1994; among others). For a property P denoted by a given ILP, one may say that "once a P, tendentially always a P" (Chierchia, 1995, p. 198). By contrast, SLPs such as *be busy* or *be happy* denote temporary, accidental properties. A classic example distinguishing these two classes of stative predicates comes from the Spanish copulars, *ser* and *estar*, which are typically used for ILPs and SLPs respectively (Arche, 2006; Husband, 2012):

(45) a. Juan #es/está peinado/cansado.
Juan ser/estar combed/tired
'Juan is combed/tired'

b. Juan es/?está inteligente/sincero.
Juan ser/estar intelligent/sincere
'Juan is intelligent/sincere.'

SLPs differ from ILPs in terms of the requirements on an individual's existence (Musan, 1995, 1997). In an out-of-the-blue context, an SLP in the past tense simply implicates that the event time of the main predicate is over; no inference can be drawn with regards to the lifespan of the subject NP.

In addition to lifetime effects, several other diagnostic tests have been used to identify the ILP/SLP distinction in previous work. First of all, it has been observed that ILPs typically lead to infelicity in perception report (Carlson, 1977):

(46) John saw the swimmer naked/#intelligent.

(47) John saw Mary talk to/#know Bill.

Secondly, Carlson (1977) and Diesing (1988, 1992) point out so-called "subject effects": with a bare plural subject, SLPs admit both existential and generic reading of the subject (as in 48a), whereas ILPs admit only a generic reading (as in 48b); with a singular indefinite subject, SLPs allows a non-specific, a specific, and a generic reading (as in 49a), whereas ILPs exclude the non-specific reading (as in 49b):

(48) a. Teachers are busy. (existential or generic)

b. Teachers are altruist. (generic)

(49) a. He says that a teacher is busy. (non-specific, specific or generic)

b. He says that a teacher is altruist. (specific or generic)

A third test comes from Milsark (1974), who shows that SLPs but not ILPs allow for there-constructions:

(50) a. There are students smoking

b. #There are students knowing French

Finally, Kratzer (1995) notes that ILPs and temporal adverbials are generally incompatible with each other, as in (51b):

(51) a. John was really busy last month

b. John was from America # last month

This is often taken as evidence that ILPs express properties that are independent of spatial and/or temporal restrictions. However, it has also been noted that different adverbials show different effects with regard to the ILP/SLP distinction, and the ones that are of longer duration do occur with some ILPs (Fernald, 2000; Percus, 1997):

(52) a. John was a dancer in 1978 / # this morning

b. John had blue eyes # in 1978 / # this morning

This suggests that ILPs may not constitute a homogeneous class as previously considered, at least in some respects.

Nevertheless, the four tests mentioned above have been widely used to demonstrate that ILPs and SLPs have clearly different distributions. The long-standing dichotomy between ILPs and SLPs, however, is not without problems. Recent development in theoretical semantics has cast doubt on whether such a dichotomy is as clear-cut as assumed by Carlson (1977). It has been noticed that some ILPs also have a stage-level reading, and given appropriate contextual support, they can often be coerced into an SLP when appearing in the past tense (Fernald, 2000; Kratzer, 1995):

(53) a. John was a pop singer. $\rightsquigarrow$ John is dead

b. John was a pop singer. Years ago, however, he abandoned his career. $\not\rightsquigarrow$ John is dead

In an out-of-the-blue context like (53a), the individual-level reading is still strongly preferred, giving rise to the inference that John is dead. However, with appropriate contextual support, the stage-level reading in (53b) can be successfully obtained. The possibility of coercing an ILP into a stage-level reading depends on the degree of "temporal persistence" denoted by the property of that ILP. For an ILP like *have blue eyes*, it would be much more difficult unless we construct a context where some traumatic event occurred, e.g. *John had blue eyes. Last year, he lost both of his eyes in an accident.* Nevertheless, *have blue eyes* is typically classified as an ILP based on the various diagnostic tests mentioned earlier. It must be noted that the ILP/SLP distinction is based on how language encodes the reality rather than what the reality itself is like, since linguistic permanence and world knowledge permanence can sometimes disassociate.

Thus, as Fernald (2000) puts it, the sense of "permanence" that is frequently

used in describing the ILP/SLP distinction is actually a rather weak notion; it is an "intuitive but elusive" description (p. 4). ILPs are associated with properties that have the (non-necessary) tendency toward permanence, so they are undoubtedly temporally persistent in nature. This relates to Condoravdi's (1992) characterisation of ILPs with the term "temporal persistence", which specifies a default inference:

> "If a state/an event is going on at time t and there is no information that it is not going on at some later time t', then infer that it is going on at that later time t' as well."

That is to say, properties denoted by ILPs are assumed to last until the end of an individual's lifespan by default interpretation, unless it is overridden by additional conflicting information, as shown in (53b). This explains the rather homogeneous intuition about lifetime effects in an out-of-the-blue context, as well as the possible coercion from ILPs to SLPs where a past tense context may serve to supply "additional conflicting information".

More recently, Husband (2012) explores the role of verbs in stative predicates with regard to their function of determining the lifetime inferences, and ultimately argues that there is no distinction between ILPs and SLPs at the level of semantic representation. This position will be maintained throughout this dissertation. Having said that, it must be noted that the focus of the current study does not fundamentally depend on a dichotomous view of ILPs and SLPs, but on the empirical observation that lifetime effects exist as a linguistic phenomenon, at least in many tensed languages such as English. We now review some influential analyses of lifetime effects.

2.4.3 Formal Accounts of Lifetime Effects

What is the level of interpretation of lifetime effects? Does it stem from the semantic composition of tense and ILPs or should it be treated as a pragmatic inference? In this subsection, we will first examine Kratzer's formal analysis of lifetime effects,

and then discuss the implicature account (Magri, 2009; Musan, 1997) as well as the presupposition account (Mittwoch, 2008). We will show that LF-based theories such as Kratzer's correctly predict the lack of lifetime effects in Chinese bare predicate sentences, and the presupposition account correctly predict that lifetime inferences from the present tense are more robust than those from the past tense.

Kratzer (1995, p. 126) explains lifetime effects as a consequence of different argument structures of ILPs and SLPs: SLPs have an additional Davidsonian argument position "for events or spatio-temporal locations", while such an argument is missing in the argument structure of ILPs. She illustrates her proposal with conditional sentences containing a quantificational adverbial such as *always*:

(54) a. Always when Mary speaks French, she speaks it well.
always$_s$ [speak (Mary, French, s)] [speak_well (Mary, French, s)]
b. #Always when Mary knows French, she knows it well.
always$_s$ [know (Mary, French)] [know_well (Mary, French)]

Locatives are compatible with SLPs in (54a), but not with ILPs in (54b), since the latter lacks a position in its argument structure that can take *always* as a Davidsonian argument; the distinction between ILPs and SLPs are thus a type-theoretic one.[13] This analysis also explains the optionality of a temporal adverbial for SLPs: in (55), *John* is the theme, an internal argument which is based-generated within its AP and is realised through maximal projection of the predicate (Williams, 1981); *last month*, on the other hand, is a Davidsonian external argument that can be introduced into a logical representation by the locative *last month*:

(55) (Last month,) John was busy.
[before-now (l)] & [John (x) & busy (x, l)]

So the locative is introduced as a Davidsonian external argument of *busy*, to which the

[13]This view is largely shared by Diesing (1992).

past tense applies. With an ILP such as *be altruist*, however, there is no Davidsonian argument but only a theme argument, then the theme argument will be the predicate's external argument, following Williams (1981). Thus in (56), the property of being in the present or the past is predicated of *John*, the individual denoted by the subject NP:

(56) a. John is altruist. $\rightsquigarrow$ John is alive
[now (John$_3$)] & [altruist(he$_3$)]

b. John was altruist. $\rightsquigarrow$ John is dead
[before-now (John$_3$)] & [altruist(he$_3$)]

Therefore, provided the assumption that tense always applies to the external argument of the VP it attaches to, for SLPs tense applies to the event arguments, whereas for ILPs it imposes restriction on the lifetime of their subjects.

This analysis, however, is not without problems. To begin with, how a proper name like *John* comes to be bounded as a variable in the logical form (i.e. why it is l in 55 but *John* in 56) is something that Kratzer needs to explain away, perhaps through some type-shifting principles that go beyond the scope of this dissertation. Secondly, within Kratzer's framework, lifetime inferences from both tenses are on a par, which is at odds with intuitions reported below; we will return to this point when we discuss the three pragmatic accounts. More seriously, it seems difficult to justify the assumption of different semantic structures for two classes of stative predicates, which fundamentally rests on a dichotomy between ILPs and SLPs while in fact they do behave similarly in some respects (Chierchia, 1995; Landman, 2000). As a matter of fact, this analysis has been criticised for failing to explain why some non-temporal adverbials can occur with ILPs, which certainly also requires an implicit argument (in the case of ILPs, a stative variable). For instance, Landman (2000) observes that ILPs and SLPs behave alike in terms of permutation of multiple adverbials

and dropping adverbials, both of which lead to difficulty in interpreting contextually determined modifiers. This evidence casts doubt on a semantic treatment of the ILP/SLP distinction, which leads him to ultimately argue that ILPs, just like SLPs, also require an implicit argument.[14]

Apart from a semantic approach, lifetime effects have been analysed as pragmatic inferences. Musan (1995, 1997) argues that tense triggers implicatures that give rise to lifetime effects, but it does so only indirectly. She proposes the following in the lexical entries of ILPs and SLPs:

> "$[\![be from America]\!]^{c}$ = the function f: $D_i \rightarrow D_{<e,t>}$
> such that, for any t $\in D_i$, f(t) = the partial function g: D $\rightarrow \{0, 1\}$,
> such that, for any x $\in$ D, x is in the domain of g iff x is alive at t, and for each x in the domain of g, g(x) = 1 iff x is from America at t."

Adopting a Gricean framework, Musan (1997) attributes the arise of lifetime effects from the past tense to a conversational implicature based on the Maxim of Quantity. Assuming maximal informativeness during the conversation, since the property denoted by *be from America* is supposed to hold over the lifetime of an individual, *was from America* implicates directly that the property no longer holds, which implicates indirectly that the lifetime of an individual is over, i.e. the individual in the subject position is dead. Hence, tense only has an indirect influence on lifetime effects. Following this line of reasoning, Musan (1997) argues that a speaker who observes Grice's first Maxim of Quantity will only articulate *John was from America* if John is dead, because this sentence is less informative than *John is from America.* Thus in a situation where John is still alive, both sentences are true; in particular, the past tense sentence *John was from America* will always be true because since John's birth, there is always a time in the past where John's being from America holds true. Therefore, according to Musan's analysis, the present tense sentence is more infor-

[14]See also Chierchia (1995), de Hoop and de Swart (1990), McNally (1992), and Parson (1990), who suggest that ILPs also have a Davidsonian argument.

mative than the past tense version since the temporal interval always includes TU.[15] Thus, this analysis predicts that if John is indeed alive, both present tense and past tense sentences will be judged true, but the latter is less informative.

In addition, Magri (2009) offers an analysis based on blind mandatory scalar implicature – scalar in the sense that *# John sometimes has blue eyes* is odd because it triggers the alternative that *John always has blue eyes* is false, which cannot be the case given world knowledge. It is in this sense that the scalar implicature must be "blind" to common knowledge, and it must also be mandatorily triggered since the alternative is so robust that it cannot be cancelled. To explain lifetime effects, Magri does not assume a fundamental distinction between ILPs and SLPs in terms of their syntactic position and argument structure, but instead proposes that the long-term property of ILPs is part of speaker's common knowledge, termed W_{ck}. If an individual has blue eyes at any given time, according to common knowledge they have blue eyes throughout his lifespan. Given an individual d in a world w, an individual's lifespan is formalised as λ t.$\mathbf{in}^w$(d, t). The common knowledge assumption goes as follows (Magri, 2009, p. 271):

> "For every individual d $\in$ D_e and for every world w $\in$ W_{ck} compatible with common knowledge: if there is a time t' $\in$ T such that $[\![ILP]\!]^w$ (d, t'), then $[\![ILP]\!]^w$ (d, t) for every time t such that $\mathbf{in}^w$(d, t)."

According to Magri (2009), there is no possible world within W_{ck} where the extension of ILPs does not satisfy this assumption, but there are possible worlds where the extension of SLPs does not satisfy it. What distinguishes ILPs from SLPs boils down to the compatibility between a possible world and the common knowledge of having a property at any given time in that world. For example, properties like *being tall* may only come to satisfy the common knowledge assumption at some point in life: John

[15]Note though, the present tense and the past tense are not necessarily in a scalar relationship; it is not always the case for accomplishment and achievement verbs, so aspectual properties of an event must also be considered. Nevertheless, we are only concerned with ILPs which are presumably all stative predicates, so the informativeness account still holds.

may not be necessarily tall as a child, but once he is tall, this property holds over the entire course of his life. Since the properties denoted by ILPs are homogeneous with respect to their time argument, *John was tall* then necessarily gives rise to the implicature that his life is over. Hence, lifetime effects can be explained as a result of ILPs falling out of possible worlds' consideration.

Magri's analysis largely focused on how speakers arrive at lifetime inferences from the past tense, yet it is rather unclear what kind of prediction his analysis makes for lifetime inferences from the present tense. That is to say, assuming the homogeneity of ILPs with regard to temporal interpretations, Magri's framework says little about how lifetime inferences may vary across two tenses. Thomas (2012) also points out that Magri's analysis relies on the assumption that implicatures are obligatory, but this is inconsistent with the spirit of Gricean reasoning, which does not predict the triggering of a quantity implicature if it would lead to a contextual contradiction. More recently, Husband (2012) reviews the implicature accounts of lifetime effects and points out that these approaches fail to explain the uniformity of the interpretation among speakers. In particular, he argues against the view that lifetime effects arise as a result of our world knowledge about the ILPs (cf. Magri, 2009), proposing a compositional analysis which shows that fundamentally, any pragmatic computation of such construction is rooted in the properties of its semantic structure. It is the homogeneity of predicates that ultimately triggers lifetime effects, i.e. homogeneous predicates are treated as temporally stable. This position crucially illuminates not only formal treatments of lifetime effects but also how the phenomenon should be represented incrementally. We will be building on this idea in our general discussion in Chapter 4.

Apart from the implicature account, Mittwoch (2008) proposes that lifetime effects are presuppositional in nature. She argues that lifetime inferences from the present tense and the past tense are on a par in the sense that both are presup-

positional, but lifetime inferences from past tense are more defeasible due to the contextual dependency of the English past tense. To begin with, Mittwoch (2008) provides several tests to show that the inferences from the present tense are presuppositional in nature; they can be projected in (57a) and (57b), but filtered out in certain context such as the conditional in (57c):

(57) a. John is not from America.

b. Is John from America?

c. John, if he is alive, is from America.

In (57c), the inference that John is alive disappears. Based on these properties typically associated with presuppositions, Mittwoch (2008) argues that it is appropriate to treat lifetime inferences from the present tense as presuppositional. Using the same set of tests, she shows that the inferences from past tense are also presuppositional in nature. She further argues against the scalar implicature analysis by showing that lifetime inferences cannot be cancelled when a speaker is not sure whether the stronger statement is justified, as in (58):

(58) (Pointing to a picture): This is Mike. He lives in California. This is Pete, whom you know. This is Bill. ??He was, perhaps is/if he isn't still, the oldest of the three brothers.

Another prediction made by Mittwoch's analysis is that lifetime inferences from the present and the past tense differ in terms of defeasibility. In an out-of-the-blue context, which is temporally underspecified, the topic NP – typically in the subject position since subjects are default topics in English – can provide an interval that plays the role of topic time (Musan, 1995, 1997). Additional contexts can be supplied where the topic time is no longer determined by the topic NP. To illustrate this point, note the contrast between (59a) and (59b):

(59) a. John says that Chomsky is/#was a linguist.

b. John said that Chomsky is/was a linguist.

An indexical theory of tense states that past tense (at least in English) is interpreted "in relation to a contextually given antecedent" (Mittwoch, 2008, p. 178). This explains the acceptability of (59b); according to the Sequence of Tense rule in English, here the topic time is set to the time of John's utterance, i.e. past tense predicate in the matrix clause. Thus (59b) only concerns the truth value of Chomsky being a linguist at the time of John's utterance.[16]

In sum, the implicature accounts and the presupposition account are in consensus with regards to the view that lifetime effects are pragmatic in nature. Furthermore, the presupposition account predicts that lifetime inferences from the present tense will be more robust than those from the past tense. The formal representation of lifetime effects has provided adequate theoretical basis for our discussion of contradictory lifetime inferences.

2.4.4 The Puzzle: Contradictory Lifetime Inferences

While some researchers limit the term *lifetime effects* to inferences from ILPs in the past tense, recent work has shed new light on the nature of lifetime inferences from both tenses. Typically, with an ILP, we use the past tense for the dead, and the present tense for the living. Mittwoch (2008) further points out an interesting phenomenon called "contradictory lifetime inferences", which arise when the subject conjoins one dead and one living individual:

(60) Saussure$_{dead}$ and Chomsky$_{living}$ #are/??were linguists.

[16] Arche (2006) offers a detailed description of contextual conditions that may change the specific content of topic time, and as such lifetime effects will not necessarily arise; with an additional context, topic time may shift, blocking or neutralising lifetime effects where they would have been predicted, as shown in (59b).

In (60), neither tense seems appropriate. An alternative way to construct contradictory lifetime inferences is by creating a narrative context which provides information about the life and death of two individuals, as shown in (61):

(61) This house was built for Bill Stevens, the actor, who died last year. The one over there belonged to his brother, John Stevens, the property tycoon; he now lives in America. They #are/??were both very handsome.

In the third sentence, the subject pronoun *they* refers to John and Bill, and it also functions to provide an interval for the topic time. Being an indexical pronoun, *they* has a semantic representation of its own; its discourse representation is not updated until the context has provided temporal information about the referents, in this case, John and Bill. This process of discourse update has the potential of shedding light on temporal interpretations in the nominal domain during online processing.

The current study focuses specifically on the issue of contradictory lifetime inferences. Although in principle, neither tense seems appropriate in cases like (60) and (61), lifetime inferences from the past tense are predicted to be less robust than those from the present tense, partially due to the contextual dependency of the English past tense (Mittwoch, 2008). For instance:

(62) John said Saussure and Chomsky were linguists.

Because the use of the past tense in English requires TSit to precede TU, when a sentence is embedded in a past-tense matrix clause, the past tense is typically used in the subordinate clause, in accordance with the Sequence of Tense rule. Kratzer (1998) argues that in such cases, the tense feature on the embedded copular is not interpreted at all. Meanwhile, a present tense matrix clause can never license the use of present tense in an embedded clause that has incorrect or contradictory lifetime inference:

(63) a. #John knows Saussure$_{dead}$ is a linguist.

b. #John knows Saussure$_{dead}$ and Chomsky$_{living}$ are linguists.

In addition, as noted by Kratzer (1995, p. 155), "the past tense is an effective tool for turning ILPs into SLPs". ILPs in the past tense can be coerced into a stage-level reading given a past context (Jäger, 2001; Magri, 2009). For example:

(64) a. John was a linguist. Years ago, he suddenly decided to leave the field and became a salesman.

b. Jane had blue eyes. Last year, she lost her eyes in an accident at work, and she still hasn't fully recovered.

With a plausible continuation of context, ILPs like *be a linguist* or even *have blue eyes* can receive a stage-level reading, cancelling the inferences that would have arisen from an out-of-the-blue context. With the present tense, however, the property denoted by an ILP must still hold at the time of utterance, so no coercion is possible.

To summarise, contradictory lifetime inferences can be created by setting up an appropriate discourse context, which can potentially provide much insight into how temporal information is processed in real time in both tensed and superficially "tenseless" languages. As noted above, the arise of contradictory lifetime inferences in English seems to hinge on the overt marking of past tense. In a superficially "tenseless" language like Chinese, however, lifetime effects are predicted to be absent in bare predicate sentences, since the bare predicate makes no Past/Non-Past distinction. The next subsection discusses these predictions for Chinese with reference to some previous work on temporal references in this language.

2.4.5 Do Lifetime Effects Arise in Chinese?

Very little has been said about lifetime effects in Chinese. J. W. Lin (2003) notes that the "lifetime of a proper name has a deciding influence on the interpretation of

its containing clause". He claims that in (65), if the individual in subject position is a deceased person, then world knowledge tells us that this sentence is impossible (J. W. Lin, 2010):

(65) Zhangsan zhu zhe-er
Zhangsan live here
'Zhangsan LIVE here' (infelicitous if Zhangsan is dead)

J. W. Lin attributes the infelicity in (65), incorrectly, to the arise of an lifetime inference, but this argument is flawed for two reasons. First, lifetime effects by definition is the idea that speakers obtain inferences about the life or death of individuals from a given sentence. That is to say, if we assume no prior knowledge of whether Zhangsan is alive or dead, lifetime effects should allow us to make such an inference. That is not the case in (65): if we don't know anything about Zhangsan, we would not be able to derive any inference about the life or death of this person; consequently, we would not find (65) problematic at all. In fact, this sentence is compatible with either a past or a present adverbial:

(66) er-shi nian qian / zhe ji nian, Zhangsan zhu zhe-er
twenty year ago / this several year Zhangsan live here
'Twenty years ago/In the last few years, Zhangsan LIVE here.'

More seriously, J. W. Lin fails to point out that Zhangsan does not even have to be dead in order for (65) to be false: had Zhangsan been alive but moved to somewhere else, the sentence would also be infelicitous.

Nevertheless, J. W. Lin's tenseless analysis of Chinese (as discussed in Section 2.2.2) does offer some insightful predictions about whether or not lifetime effects arise in Chinese bare predicate sentences. Recall his default viewpoint aspect rule for imperfective aspect, which applies to all sentences with an ILP:

(67) Imperfective aspect = $\lambda P_{<i,t>}\ \lambda t_{Top}\ \exists\ t\ [t_{Top} \subseteq t \wedge P(t)]$

where t_{Top} is a subset of the situation time t. Therefore, with an ILP (which is always imperfective), the temporal interval imposed by t will never clash with t_{Top}. Since the topic time is always a subset of the situation time, there will be no clash between the lifespan of the individual in the subject position and the temporal interval denoted by an ILP. This predicts that ILPs combined with a bare predicate will not trigger lifetime effects at all in Chinese, which is indeed the case:

(68) Zhangsan shi yi-ming yishujia.
Zhangsan be one-CL artist
'Zhangsan BE an artist.' $\nrightarrow$ Zhangsan is alive/dead.

In (68), no lifetime inferences can be derived; if we know nothing about Zhangsan, we simply cannot infer whether he is alive or dead based on this sentence. In fact, we can freely add adverbials such as *shengqian* 'before death' or *rujin* 'currently' before the copular *shi* to disambiguate between a past and a present interpretation.

Furthermore, when a Chinese sentence contains only the bare copular *shi*, no contradictory lifetime inference seems to arise:

(69) suoxuer he qiaomusiji dou shi yuyanxuejia
Saussure CONJ Chomsky both BE linguist
'Saussure and Chomsky both BE linguists.'

As can be seen from the gloss, (69) is not quite translatable since contradictory inferences necessarily arise with a tensed copular in English, but no contradictory inferences are triggered in Chinese because *shi* can admit past and present readings simultaneously. Note that this can be corrected predicted by a non-future tense analysis of Chinese[17] (Sun, 2014).

To summarise, the analyses of lifetime effects that have been reviewed so far predict that contradictory lifetime inferences will not arise for bare predicate sen-

[17]See Section 2.2.3 for a more detailed discussion of this analysis. We will not further elaborate on "forward lifetime effects" in Chinese here since the focus of our experimental work is on contradictory lifetime inferences from one living and one dead individual.

tences in Chinese. Since contradictory lifetime inferences minimally require a covert past tense node, the lack of this phenomenon in Chinese will provide empirical evidence against the covert past tense analysis: a tense node under a Tense Phrase with [PAST]/[NONPAST] distinction would provide a feature checking mechanism, which would otherwise render sentences like (69) unacceptable.

2.5 Processing Tenses: Linking Theories to Experimental Work

Building on theoretical studies of the syntax and semantics of tense, this dissertation is ultimately concerned with the processing of tense in English and Chinese. There is a considerably small number of psycholinguistic studies on how temporal information is processed, but some of these findings are illuminating for our cross-linguistic investigation.

In experimental studies of temporal interpretation in English, it has been shown that fronted adverbials function like a topic and thus establishes a new domain of temporal interpretation (Bestgen & Vonk, 1995, 2000; Bott, 2010; Dickey, 2001; Trueswell & Tanenhaus, 1991). Notably, Roberts and Liszka (2013) report that agreement violation between a fronted temporal adverbial and the inflected main verb in English elicits significantly longer reading times in a self-paced reading task, although the effect only exists in present perfect tense but not simple past tense. This provides evidence for the psychological reality of *topic time*, and invites further effort to bridge the linguistic realisation of tense and the online representation thereof.

In terms of cross-linguistic studies, J. Y. Chen, Su and O'seaghdha (2013) use both linguistic and non-linguistic tasks to compare the perception of time in English and Chinese languages, and argue that "the absence of tense in Chinese leads speakers to focus by default on temporal continuity as opposed to temporal segmentation"

(p. 90). However, their findings are potentially confounded with many non-linguistic factors, making it difficult to pin down the difference on the linguistic encoding of tense. More interestingly, in an ERP study Qiu and Zhou (2012) show that the agreement violation between temporal adverbs and the aspectual marker in Chinese elicits a centro-parietal P600 effect, similar to what has been found for tensed languages, suggesting that temporal agreement may rely on both lexical semantics and morphosyntactic processes. In short, there is substantial evidence that Chinese speakers are also sensitive to agreement violation of temporal information during online comprehension, even though the language does not encode the past tense overtly. As far as we know, however, the question of how temporal information is processed in Chinese bare predicate sentences has not been addressed, which in fact has the potential of probing into both online and offline representations of the tense system in Chinese.

In light of a gap in the literature, this dissertation takes up the issues of the processing of tense via the marriage between formal semantics and psycholinguistics. While formal semantics, in particular theories of event semantics, provides the theoretical foundation of our core thesis, psycholinguistic techniques equip us with essential tools that can tap into the real-time processing of temporality. Due to the tension between the morphosyntactic complexity of a language and the processing difficulty thereof, we find ourselves in a position to suggest a possible "linking theory" that bridges that linguistic theories to behaviours and the brain. Ansaldo et al (2015), following Bisang (2009), argue that Chinese is an example of languages which lack overt morpho-syntactic complexity yet "display a high degree of hidden complexity" (p. 120). It is theoretically possible that sentences like (69) still involve a reasoning process that is expected to appear costly online, even though they do not ultimately lead to a penalty in offline measurements. Therefore, by combining offline and online processing techniques, we show in the next chapter how sentences with contradictory lifetime inferences are processed in English and Chinese respectively.

Chapter 3

Experiments

Theoretical discussions about tense and lifetime effects have laid a solid foundation for us to test our research questions empirically by using psycholinguistic techniques. In particular, we predict two types of effects: the *verbal tense effect* arises as a result of temporal-mismatching at the sentential level, whereas the *nominal tense effect* stems from a potential conflict of semantics features in the nominals, following the assumption that nouns – just like verbs – also have a hierarchical structure that contains a Tense Phrase. This chapter presents results from one pilot study and four follow-up experiments, two in English and two in Chinese, which investigated the online and offline processing of lifetime effects in these two languages.

3.1 Pilot Studies

In S. Y. Chen and Husband (in prep), we conducted the first study to establish the issue of lifetime effects in a quantitative manner. The experimental materials used in this study include common nouns and proper names that can be safely assumed as well-known to the majority of American English speakers, as revealed by a norming study. We manipulated the subject type such that it contains one living individual, one dead individual, or one living and one dead individual, and all three subject types

are combined with two tenses, producing a 3 × 2 factorial design. An acceptability judgement study (N = 24) and a self-paced reading study (N = 36) were hosted on IbexFarm (Drummond, 2016), with participants recruited from Amazon Mechanical Turk (MTurk). Our results suggest that English speakers are able to detect contradictory lifetime effects during offline and online processing: sentences with contradictory lifetime inferences received significantly lower acceptability ratings, and caused reading time disruption on the ILP region during online language comprehension, patterning with sentences that bear mismatching temporal information.

Results from the pilot study confirmed our theoretically motivated predictions. However, the effects were found only in the present tense condition during online processing; no statistically reliable results were obtained in the past tense. This asymmetry across two tenses is consistent with several theoretical accounts of lifetime effects: Mittwoch's presupposition account (2008) and Musan's informativeness-based implicature account (1997) both predict a more robust effect in the present tense (see Section 2.4.3 and 2.4.4 for a detailed discussion). It is also consistent with previous findings on the processing of tenses: Roberts and Liszka (2013) report a self-paced reading study where the agreement violation between a fronted temporal adverbial and the inflected main verb caused processing difficulty only in the English present perfect, but not the past tense. Therefore, based on the aforementioned theoretical discussions as well as empirical findings, we expect to observe a more robust effect from the present tense in our follow-up studies.

The experimental design in our pilot study may have suffered from several limitations. First of all, the experimental materials used proper names with referents in the real world, so the participants' responses were necessarily influenced by whether or not they actually knew if a particular celebrity was alive at the time of the experiment. We addressed this issue by conducting several norming studies to assess the appropriateness of the materials, and additionally, through an offline questionnaire

at the end of the self-paced reading task; only the trials whose corresponding question received a correct answer were included in the final analysis. A second problem with the experimental design is that, because sentences with contradictory inferences always have two NPs in the subject position, they might have been more salient than the other two conditions where there is only one NP, leading the participants to develop strategic processing during the task. It is rather unclear how this would have affected the results in our pilot study. Finally, the subject NPs used in the study are all culturally heavy terms and subject to changes in the real world, which makes it difficult for future replication and cross-linguistic comparison.

3.2 Offline Processing

In light of the above-mentioned pitfalls, we developed a new set of experimental materials (see Appendix II) in which lifetime information about two individuals is provided in the context for each item, as shown in (70):

(70) This house was built for Bill Stevens, the actor, who died last year. The one over there belonged to his brother, John Stevens, the property tycoon; he now lives in America. They #are/??were both very handsome.

Essentially, this design not only avoids the problems we identified in the pilot study, but it also has the advantage of being easily replicated since any change in the real world is no longer a concern. Additionally, because the new material does not involve culturally heavy terms, cross-linguistic comparison is feasible via translation into another language. For this particular purpose, the experimental materials were translated from English into Chinese (see Appendix III), with changes being made as minimally as possible to accommodate cultural differences.

We first present the offline data in English and Chinese from two acceptability judgement studies.

3.2.1 Experiment 1: Acceptability Judgement in English

Participants

Twenty-four participants were recruited on MTurk. All participants reported to be native speakers of American English, with English being the dominant language of daily use. All participants provided their written informed consent to participate in the experiment and received monetary compensation. Experimental sessions lasted approximately 20 minutes. All methods were approved by Social Sciences & Humanities Inter-Divisional Research Ethics Committee at the University of Oxford.

Design, Materials, & Procedures

The experiment was written in JavaScript and hosted on IbexFarm (Drummond, 2016). A total of 60 items with a 3 × 2 factorial design were used:

	Living-Living	Dead-Dead	Conjoin
Lifetime	This house was built for John, who is a local real estate agent in town. The one over there belongs to his brother, Bill, who now lives in Europe.	This house was built for John, who passed away last year. The one over there belonged to his brother, Bill, who lived his whole life in Europe.	This house was built for John, who passed away last year. The one over there belongs to his brother, Bill, who now lives in Europe.
Tense	They are/were both very handsome.		

Table 3.1: Experiment 1: Sample item

Participants were asked to read sentences of the following format (Figure 3.1):

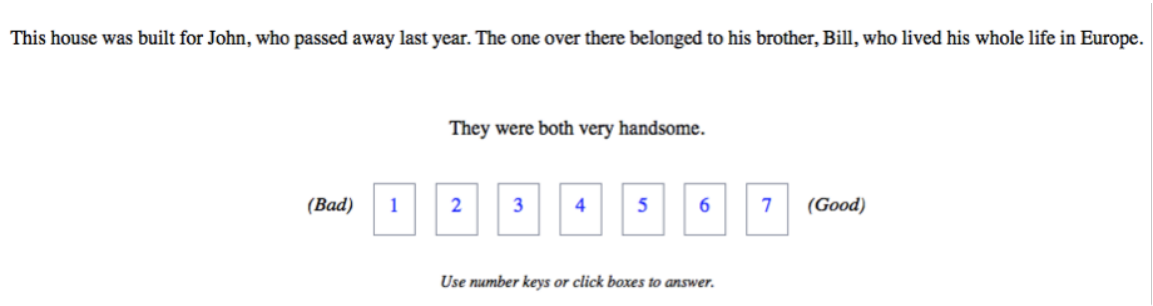

Figure 3.1: Experiment 1: Sample trial

They were asked to read all three sentences in each item and then rate the **third** sentence on a scale of 1-7, with 1 being "very unnatural" and 7 "perfectly fine". Six conditions were distributed in a Latin Square design, and participants were randomly assigned to one of the six lists.

Predictions

As discussed above, we expected a more robust effect in the present tense and a weak effect in the past tense. In the present tense condition, the Conjoin condition and the Dead-Dead condition were expected to receive significantly lower ratings compared with the Living-Living condition.

Results & Data analysis

Analysis of RTs per subject suggested that no subject should be removed. Trials whose RTs were shorter than 2000 ms or more than 2.5 standard deviations above the mean were removed from further analysis, since RTs that fall out of these ranges do not suggest normal language processing. The methodological procedures established here were followed in all subsequent experiments.

The means of the acceptability ratings for each condition are summarised in Table 3.2 (parentheses represent standard error by participants):

	Living-Living	Dead-Dead	Conjoin
Present	5.50 (0.11)	3.65 (0.14)	3.94 (0.14)
Past	4.57 (0.14)	5.58 (0.12)	4.71 (0.14)

Table 3.2: Experiment 1: Acceptability ratings

In the present tense, the Living-Living condition received higher acceptability ratings compared with the Conjoin condition and the Dead-Dead condition. In the past tense, the Dead-Dead condition received the highest ratings while the other two conditions patterned together. Raw data is plotted in Figure 3.2, where the curve illustrates the data distribution, the shaded areas represent 95% confidence intervals, and the lines

within each shaded area represent the mean values.

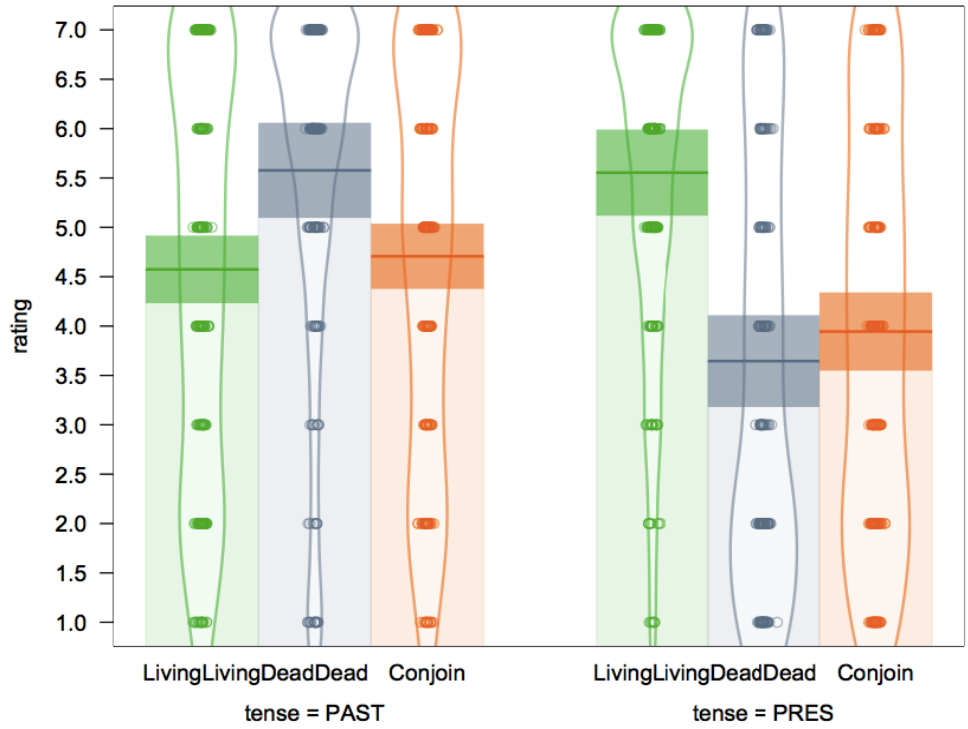

Figure 3.2: Experiment 1: CIpirate plot for acceptability ratings

Statistical analysis was carried out using Linear Mixed Effect Model in R (R Core Team, 2016), with the maximal random effect structure that allowed the model to converge (see Table 3.3). Tense and subject type were coded as fixed effects, whereas item and participant were coded as random effects. The two tense conditions are sum coded. As for the three subject type conditions, the first contrast is between Living-Living and Dead-Dead & Conjoin (i.e. *verbal tense effect*), and the second contrast between Dead-Dead and Conjoin (i.e. *nominal tense effect*).

We observed a main effect of tense (t = -4.076, $p < .001$), suggesting that the present tense and the past tense behaved differently. In the full model, there was a highly significant interaction between tense and the first contrast (t = 12.126, $p < .001$), as well as a significant interaction between tense and the second contrast (t = 5,343, $p < .001$). Overall, as predicted, the Conjoin condition patterned consistently with the temporal-mismatching subject type in each tense, receiving signifi-

	Estimate	Std. Error	df	t value	Pr(> |t|)
Intercept	4.680	0.199	29.000	23.490	<.001 ***
tense	0.284	0.079	25.400	4.076	<.001 ***
verbal	0.387	0.0920	28.800	4.207	<.001 ***
nominal	0.136	0.077	25.000	1.765	.090 .
tense:verbal	0.756	0.062	1194.600	12.126	<.001 ***
tense:nominal	0.295	0.055	1202.700	5.343	<.001 ***

Table 3.3: Experiment 1: Full model for acceptability ratings

cantly lower ratings when compared with the temporal-matching subject type. Model comparison conducted with ANOVA confirmed that the interactions were highly significant (χ^2 (2) = 163.54, p < .001).

Discussion

In both tenses, sentences from the Conjoin Condition were judged as significantly less acceptable compared to sentences in the temporal-matching condition. The significant interactions between tense and subject type provide evidence that English speakers are sensitive to lifetime inferences in both tenses during offline judgement, and the predicted effect is indeed more robust in the present tense.

3.2.2 Experiment 2: Acceptability Judgement in Chinese

Participants

Twenty-four native speakers of Chinese were recruited from the undergraduate and postgraduate communities at Shanghai International Studies University. Everything else followed Experiment 1.

Design, Materials, & Procedures

The experimental materials were presented in simplified Chinese characters:

	Living-Living	Dead-Dead	Conjoin
Lifetime	这栋房子属于张军，他在本地一间房地产公司上班。隔壁这栋房子属于他哥哥李强，他目前仍在欧洲生活。 This house BELONG to Zhang Jun, he WORK at a local real estate agent in town. The one next door BELONG to his brother, Li Qiang, he now still LIVE in Europe.	这栋房子属于张军，他去年去世了。隔壁这栋房子属于他哥哥李强，他终其一生都在欧洲生活。 This house BELONG to Zhang Jun, he PASS AWAY last year. The one over there BELONG to his brother, Li Qiang, he LIVE his whole life in Europe.	这栋房子属于张军，他去年去世了。隔壁这栋房子属于他哥哥李强，他目前仍在欧洲生活。 This house BELONG to Zhang Jun, he PASS AWAY last year. The one over there BELONG to his brother, Li Qiang, he now still LIVE in Europe.
Tense	他们都(曾)是英俊的男人。 They both (once) BE very handsome.		

Table 3.4: Experiment 2: Sample item

Crucially, two bare predicates in Chinese – *you* 'have/possess' and the bare copular *shi* – were used to test whether there is a Past/Non-Past distinction as there is in English; we named this the Unmarked condition. In parallel to the English past tense, we also used an experiential aspect marker *ceng* 'once' for the Past Adverbial condition.

Participants were asked to read sentences of the following format:

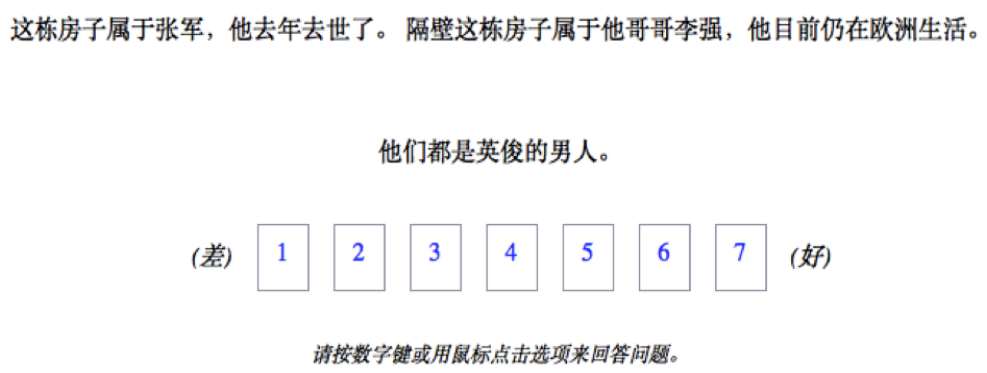

Figure 3.3: Experiment 2: Sample trial

(Transliteration of the trial: This house BELONG to Zhang Jun, he PASS AWAY last year. The one over there BELONG to his brother, Li Qiang, he now still

LIVE in Europe. They both BE very handsome man.)

All other aspects of experimental procedures followed Experiment 1.

Predictions

Two predictions were made about the Unmarked condition, depending on whether or not the Chinese bare predicate is sensitive to a Past/Non-Past distinction. On the one hand, if there is indeed a covert tense node with a Past/Non-Past distinction, then we would expect to observe a main effect of subject type; the Conjoin condition should receive lower ratings as it did in the English experiment. On the other hand, if the bare predicate does not make a Past/Non-Past distinction even covertly, then we would expect a null effect of subject type in the Unmarked sentences.

Regardless of the existence of a covert tense, in the Past Adverbial condition, we expected a main effect of subject type just as in the English past tense, with both the Conjoin condition and the Living-Living condition receiving lower ratings compared with the Dead-Dead condition. This is because the experiential aspect marker *ceng*, just like *once* in English, unambiguously determines a past interpretation in this context, which leads to an anomalous reading when at least one of the individuals is still alive.

Results & Data analysis

Analysis of RTs per subject revealed one outlier. All methodological procedures followed those established in Experiment 1. The means of the acceptability ratings for each condition are summarised in Table 3.5 (parentheses represent standard error by participants). Raw data is plotted in Figure 3.4 which shows the data distribution, the 95% confidence intervals, and the mean of each condition.

Statistical analysis followed Experiment 1. In the full model (see Table 3.6), we observed a main effect of tense ($t = 2.988$, $p < .01$), suggesting that the Unmarked

	Living-Living	Dead-Dead	Conjoin
Unmarked	4.56 (0.15)	4.52 (0.14)	4.43 (0.14)
PastAdv	3.50 (0.14)	4.64 (0.15)	3.67 (0.14)

Table 3.5: Experiment 2: Acceptability ratings

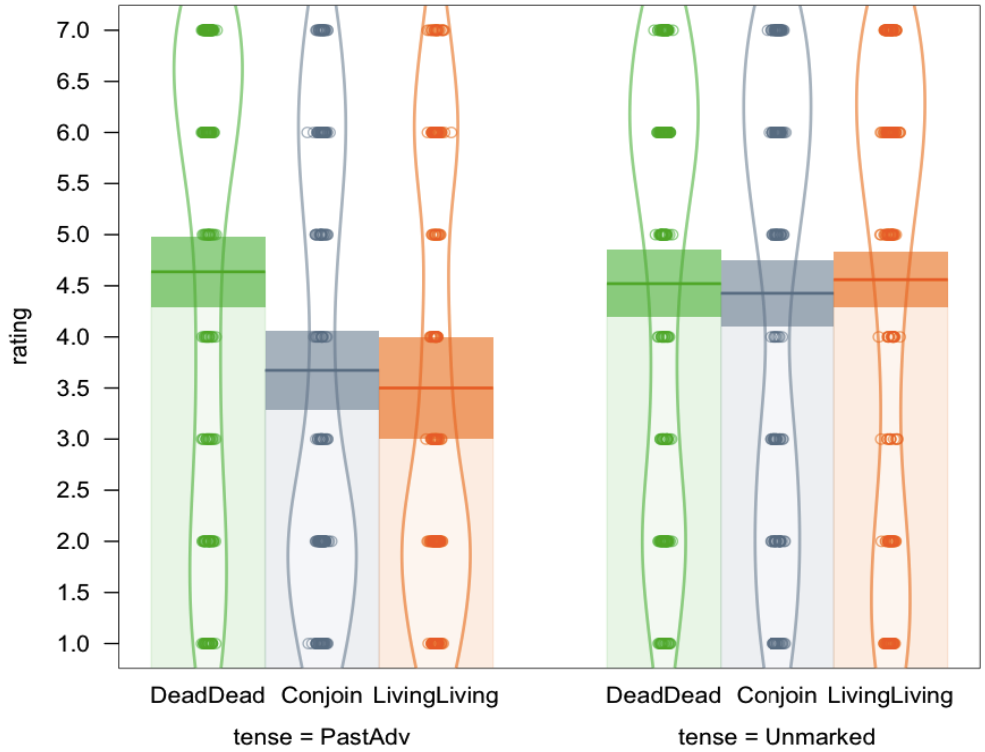

Figure 3.4: Experiment 2: CIpirate plot for acceptability ratings

	Estimate	Std. Error	df	t value	Pr(> |t|)
Intercept	4.229	0.229	27.800	18.455	< .001 ***
tense	0.284	0.095	23.700	2.988	< .01 **
verbal	-0.361	0.110	24.500	-3.280	< .01 **
nominal	-0.006	0.069	44.300	-0.093	.927
tense:verbal	0.331	0.067	1079.000	4.955	< .001 ***
tense:nominal	-0.067	0.057	1075.000	-1.165	.244

Table 3.6: Experiment 2: Full model for acceptability ratings

condition and the Past Adverbial condition behaved differently. The two tense conditions are sum coded. As for the subject types, the first contrast between Dead-Dead and Living-Living & Conjoin (i.e. *verbal tense effect*) was significant as a main effect ($t = -3.280$, $p < .01$), but the second contrast between Conjoin and Living-Living (i.e.

nominal tense effect) was not (t = -0.093, p = .927). The interaction between tense and the first contrast was significant (t = 4.955, p < .001), but not the interaction between tense and the second contrast (t = -1.165, p = .244).

Comparison between the full model and the main model (excluding interaction) in ANOVA showed that the interaction was not significant ($\chi^2(9) = 10.581$, p = .306). In addition, planned comparison within each tense condition revealed no effect of subject type in the Unmarked condition. The overall significance in the full model was thus driven by a main effect of the subject type in the Past Adverbial condition.

Discussion

Results from Experiment 2 suggest that, first of all, Chinese bare predicate sentences admit both past and present reading, as well as simultaneous past-present reading. This supports the hypothesis that there is no covert tense with Past/Non-Past distinction in Chinese, which would otherwise render sentences in the Conjoin condition anomalous. Secondly, as predicted, lifetime effects also arise in Chinese when an experiential aspect marker *ceng* is used, which functions like the adverbial *once* in English. However, note that the Dead-Dead condition received similar ratings across both "tense" conditions, suggesting that when both individuals are dead, the adverbial *ceng* is in fact entirely optional for deriving a past interpretation of the subject.

In sum, based on results from Experiment 2, we found no evidence for a covert past tense in Chinese. This leaves us with two possibilities: either Chinese is completely tenseless, or it simply has no Past/Non-Past distinction but possesses a different type of tense distinction, e.g. Future/Non-Future, which would still be consistent with the judgement data. Neither of these possibilities can be ruled out based on the offline measurements reported in Experiment 2, but they do make different predictions with regards to the online processing of lifetime effects. If Chinese is completely

tenseless, then a null effect of subject type should also be expected online. But if Chinese does make a Future/Non-Future distinction, then Chinese speakers may still encounter difficulty while reading sentences from the Conjoin condition, possibly due to an "online update" process when the online representation of tense is formed, even though this online difficulty does not ultimately result in any penalty in the final outcome of language processing. We used a self-paced reading task to test these two hypotheses in the following experiments.

3.3 Online Processing

3.3.1 Experiment 3: Self-paced Reading in English

Participants

Sixty native speakers of English were recruited on MTurk. An additional thirty-six participants were recruited from the University of Oxford undergraduate community. Experimental sessions lasted approximately 40-60 minutes. Participants received either monetary compensation or course credits for their time. Everything else followed Experiment 1.

Design, Materials, & Procedures

Using Experiment 1 as a norming study, we selected the strongest 42 items to be included in Experiment 3. The experiment used a phrase-by-phrase, centred, serial visual presentation with self-paced reading design. Participants read each sentence as a series of word "chunks", seeing only one part of the sentence at a time, and they were instructed to move on to the next "chunk" by pressing the space bar at their own pace. Figure 3.5 illustrates how the sentences were split into "chunk":

Critical sentences were followed by a spillover sentence that was kept consistent across all six conditions, e.g. *Their relatives are gathering together next month.* We

This house was | built for John | who passed away | last year. | The one over there | belonged to his brother, Bill, | who now lives | in Europe. | They are both | very handsome. | Their relatives | are gathering together | next month for a reunion.

Figure 3.5: Experiment 3: Word "chunks" in English

carefully manipulated the spillover sentences such that they should not affect on the temporal interpretation of the previous critical sentences. A multiple-choice comprehension question was included at the end of each trial in order to monitor if the participants were paying attention to the task. In addition, participants were forced to take a short break for 10 seconds every 20 – 25 sentences, but they were advised to not pause during a trial.

Predictions

In the present tense condition, we expected a strong *verbal tense effect*: the Conjoin condition and the Dead-Dead condition should cause reading time disruption when compared with the Living-Living condition. The effect should occur on or after the ILP region, since this is the earliest point where participants would receive all necessary information in order to arrive at a lifetime inference.

Results & Data analysis

On average, all participants reported normal RTs. Six participants were removed due to poor performance in the comprehension questions (i.e. below 75% accuracy). Methodological procedures followed those established in Experiment 1. We analysed the RT measurements on five critical regions: Subject NP & predicate, the ILP, and three spillover regions.

RT patterns for all critical regions in the past tense are illustrated in Figure 3.6, and the present tense in Figure 3.7. Statistical analysis revealed no effect of sub-

ject type on any critical region in the past tense. However, in the present tense, the Conjoin Condition elicited longer RTs on ILP region compared to Living-Living and Dead-Dead conditions, and on the third spillover region, both the Conjoin condition and the Dead-Dead condition elicited longer RTs than the Living-Living condition. RTs for all critical regions in the present tense are summarised in Table 3.7 (parentheses represent standard error by participants).

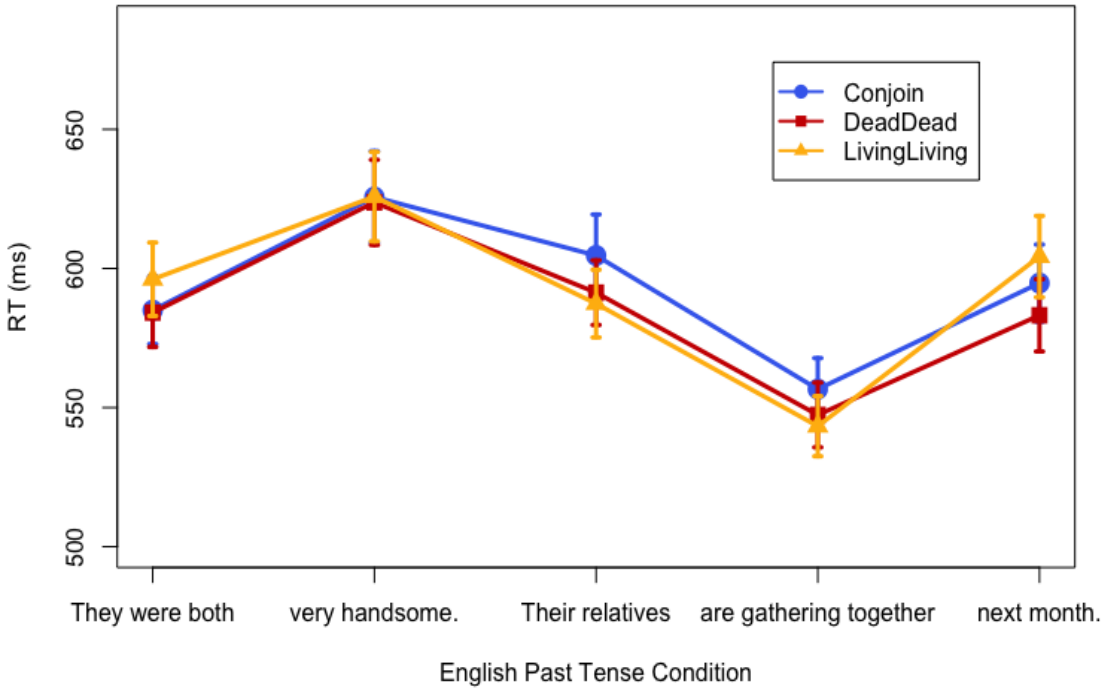

Figure 3.6: Experiment 3: English past – RTs on critical regions

	Subject + PRED	ILP	Spillover 1	Spillover 2	Spillover 3
Conjoin	601(13)	653(17)	626(15)	558(13)	610(15)
Dead-Dead	575(13)	601(14)	571(13)	533(10)	610(16)
Living-Living	560(10)	596(13)	593(13)	543(12)	577(12)

Table 3.7: Experiment 3: English present – RTs (ms) on critical regions

On the ILP region, RTs for the Conjoin condition were 52ms longer than the

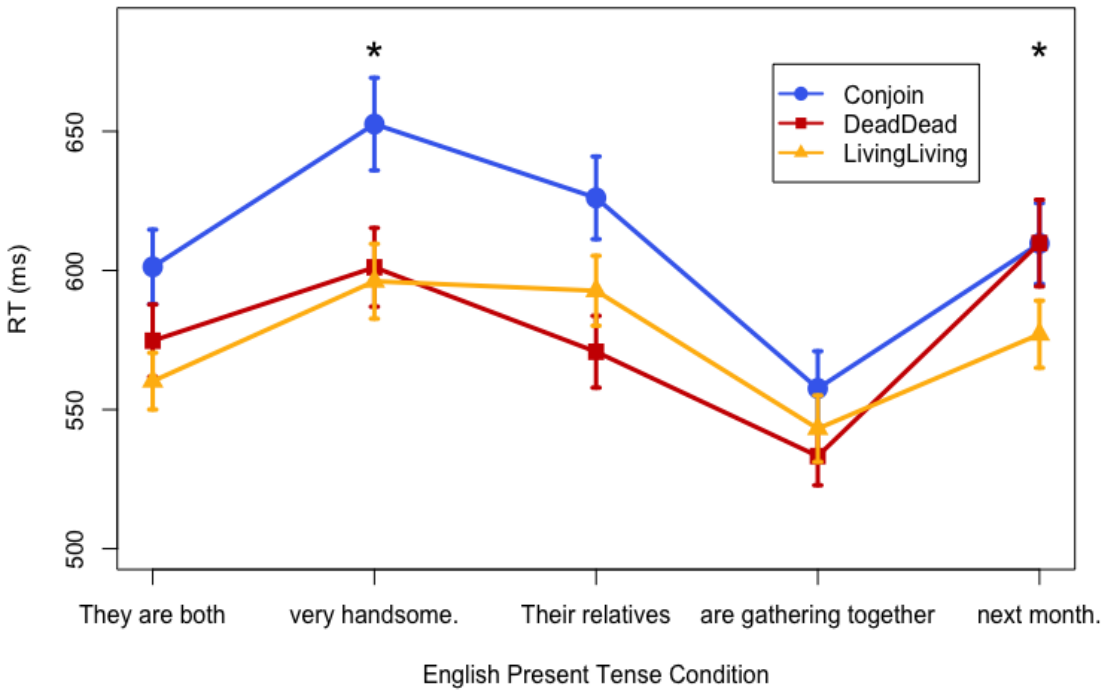

Figure 3.7: Experiment 3: English present – RTs on critical regions

Dead-Dead condition and 57ms longer than the Living-Living condition. Raw RTs were plotted in Figure 3.8 showing the data distribution, the 95% confidence intervals, and the mean values.

	Estimate	Std. Error	df	t value	Pr(> |t|)
Intercept	6.303	0.047	4.000	132.905	<.001 ***
tense	-0.001	0.007	5.800	-0.158	.880
nominal	-0.012	0.008	25.800	-1.538	.136
verbal	-0.002	0.007	24.300	-0.237	.815
tense:nominal	-0.018	0.007	2897	- 2.777	<.01 **
tense:verbal	-0.010	0.006	2894	- 1.702	.089 .

Table 3.8: Experiment 3: English present – Full model on ILP region

Statistical analysis was conducted on this region using the linear mixed effect model, and RTs in the model were plotted in Figure 3.9. The two tense conditions

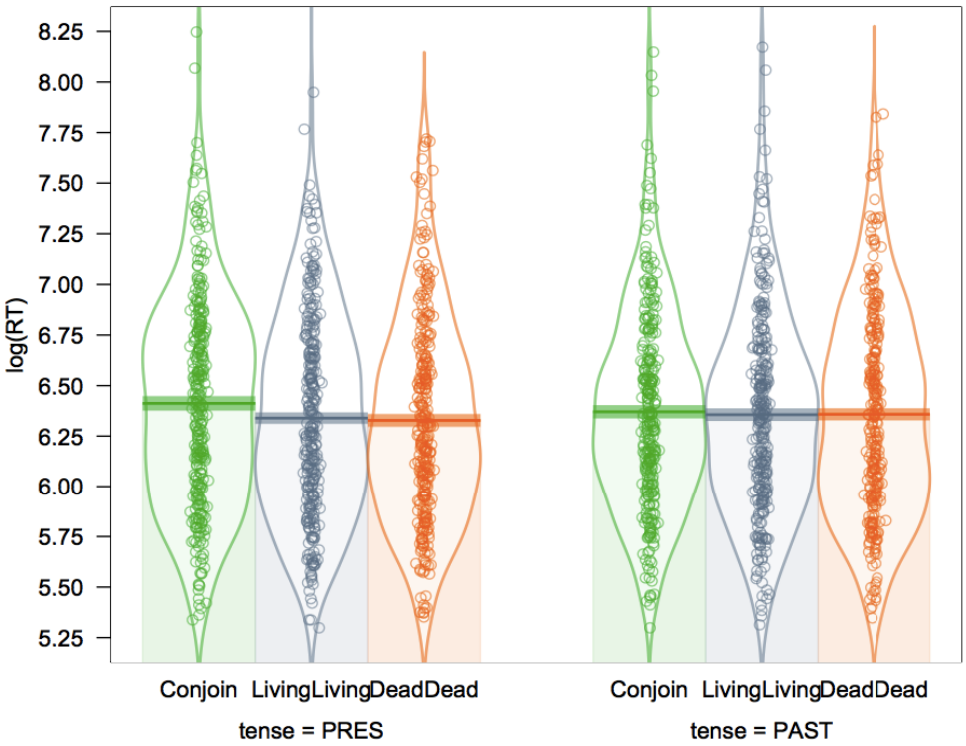

Figure 3.8: Experiment 2: English present – CIpirate plot for RTs on ILP

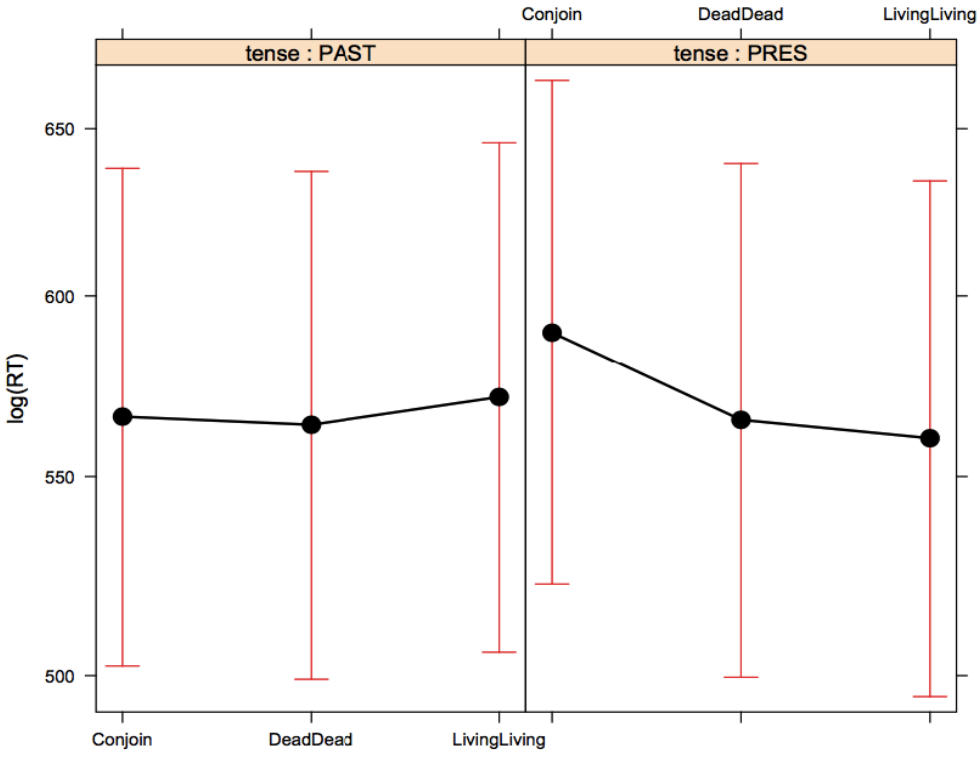

Figure 3.9: Experiment 2: English present – Effect plot for RTs on ILP

were sum coded. For the three subject type conditions, the first contrast was between Conjoin and Living-Living & Dead-Dead (i.e. *nominal tense effect*), with only the Conjoin condition contributing conflicting temporal features to the nominals; the second contrast was between Dead-Dead and Living-Living (i.e. *verbal tense effect*. The full model (see Table 3.5) revealed a significant interaction between tense and the first contrast (t = -2.777, $p < .01$); the interaction was also significant in ANOVA ($\chi^2(2) = 163.54$, $p < .01$). Planned comparison within the present tense condition revealed that there was a main effect of subject type; the first contrast of subject type was significant (t = -3.007, $p < .005$).

On the third spillover region, RTs for the Conjoin condition and the Dead-Dead condition were both 33ms longer than the Living-Living Condition. Raw RTs were plotted in Figure 3.10.

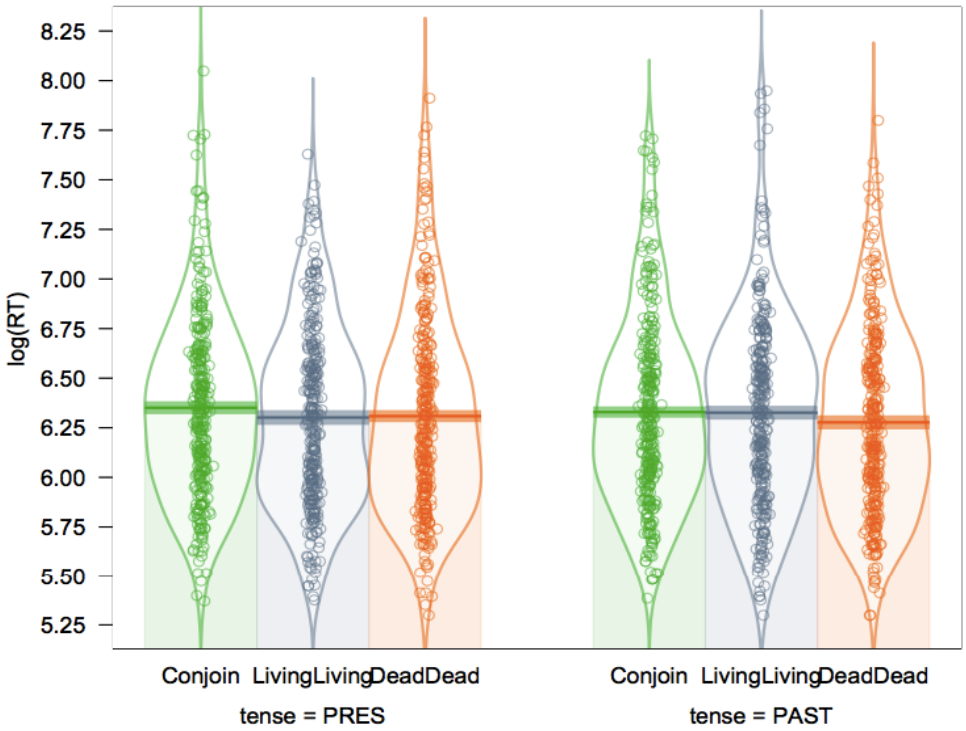

Figure 3.10: Experiment 3: English present – CIpirate plot for RTs on spillover

Statistical analysis was conducted on this region using the linear mixed effect model, and RTs in the model were plotted in Figure 3.11. As in previous analyses,

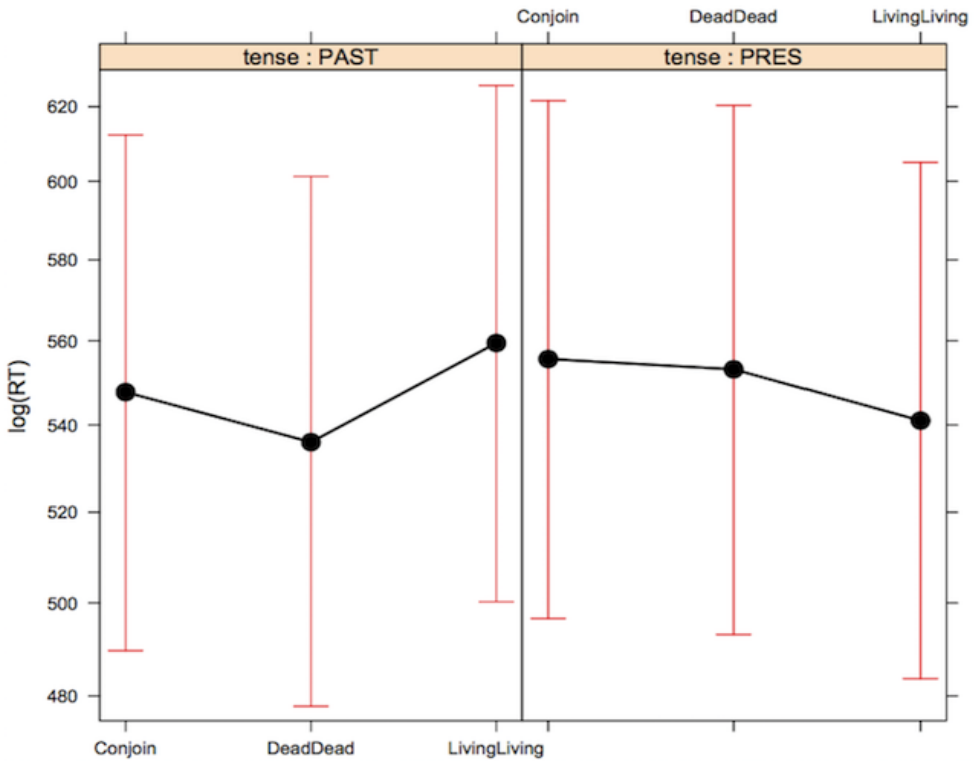

Figure 3.11: Experiment 3: English present – Effect plot for RTs on spillover

the two tense conditions were sum coded. For the three subject type conditions, the first contrast was between Living-Living and Dead-Dead & Conjoin (i.e. *verbal tense effect*), with the latter two being mismatching with verbal tense information; the second contrast was between Dead-Dead and Conjoin (i.e. *nominal tense effect*). The full model (see Table 3.9) revealed a significant interaction between tense and the first contrast ($t = -3.200$, $p < .005$); the interaction reached marginal significance in ANOVA ($\chi^2(2) = 11.986$, $p = .064$). Planned comparison within the present tense revealed that the first contrast was significant ($t = 2.195$, $p < .05$), suggesting that the *verbal tense effect* was also statistically reliable.

Discussion

In Experiment 3, we observed two main effects in the present tense condition: the *nominal tense effect* on the ILP region, and the *verbal tense effect* on the third spillover region. The Conjoin condition is the only subject type that involves a conflict of features in the nominals, with one dead individual contributing a [PAST]

	Estimate	Std. Error	df	t value	Pr(> |t|)
Intercept	6.276	0.0468	5.900	134.233	<.001 ***
tense	0.002	0.004	84.800	0.476	.635
verbal	0.001	0.007	6.700	0.186	.858
nominal	0.005	0.010	2.200	0.550	.633
tense:verbal	0.020	0.006	2925	3.200	<.05 **
tense:nominal	0.006	0.005	2.937	1.087	.277

Table 3.9: Experiment 3: English present – Full model on spillover

feature and one living individual a [NONPAST] feature. The *nominal tense effect* on the ILP region is unexpected but extremely interesting from both theoretical and experimental perspectives, as it suggests that the participants were sensitive to temporal features in the nominals and their interaction with verbal tense. The *verbal tense effect* found on the third spillover region was predicted: sentences with mismatching temporal information (i.e. Conjoin condition and Dead-Dead condition) caused processing difficulty during online comprehension due to a conflict of features between the nominals and the present tense copular. These results are consistent with the findings in Experiment 1: sentences with mismatching temporal information were judged as less acceptable, which translates into reading time disruption during online processing.

The *verbal tense effect* appears to be a late effect, which is a somewhat surprising finding: linearly speaking, the participants should have all the temporal information they needed for evaluating lifetime inferences as soon as they reached the ILP region, but the verbal tense effect did not arise until the third spillover region. This may reflect an "online update" process that takes extra time during incremental processing.

There seems to be no effect of subject type in the past tense sentences, potentially due to a ceiling effect from processing information in the past contexts. This null effect is nevertheless interesting considering that lifetime inferences from the past

tense have always been the focus of previous theoretical discussions, mainly due to the idea that inferring someone is dead is somehow more dramatic than inferring someone is still alive. Instead, our results (here and in the pilot study) show that English speakers are actually more sensitive to lifetime effects in the present tense, a finding in line with the presupposition account.

3.3.2 Experiment 4: Self-paced Reading in Chinese

Participants

Sixty native speakers of Chinese were recruited in Shanghai. Experimental sessions lasted approximately 30-45 minutes. Everything else followed the previous experiments.

Design, Materials, & Procedures

Participants read each sentence as a series of word "chunks":

这栋房子	‖ 属于张军，	‖ 他去年	‖ 去世了。	‖
This-CL house	‖ BELONG to Zhang Jun	‖ he last year	‖ PAST-AWAY asp	‖
隔壁这栋房子	‖ 属于他哥哥李强，	‖ 他目前	‖ 仍在欧洲生活。	‖
next this-CL house	‖ BELONG to his brother Li Qiang	‖ he now	‖ still in Europe live	‖
他们都	‖ 是	‖ 英俊的男人。		‖
3SG-PL both	‖ BE	‖ handsome NOMINALISER man		‖
他们的亲戚	‖ 会在下个月	‖ 举行家庭聚会。		‖
3SG-PL POSS relative	‖ MODAL in next-CL month	‖ host family gathering		‖

Figure 3.12: Experiment 4: Word "chunks" in Chinese

All other aspects of experimental procedures followed Experiment 3.

Predictions

Based on the results from Experiment 2, we conclude that there is no covert past tense in the syntax of Chinese. Assuming that offline measures reflect the difficulty

of online processing, if Chinese is completely tenseless, we may expect a null effect of subject type in sentences with the bare predicate: the Living-Living, Dead-Dead, and Conjoin conditions should elicit similar RTs across all critical regions.

However, if there is a tense node with Future/Non-Future distinction, which can still account for the results in Experiment 2, then it is possible that the final judgement of these sentences does not actually inform us of any potential processing difficulty that might have occurred in real time. We might still expect to see a *verbal tense effect* similar to what has been observed in English: the Conjoin and Dead-Dead conditions would also elicit longer RTs compared to the Living-Living condition, on or after the ILP region. Such a pattern would suggest a step-by-step computation of temporal information in Chinese sentences despite the lack of overt past tense marking.

In the Past Adverbial condition, we still expect to see a main effect of subject type just as in English, but since our results from Experiment 3 suggest a potential ceiling effect from the English past tense, it would not be surprising to find a weak effect in the Chinese counterpart.

Results & Data analysis

On average, all participants reported normal RTs. Four participants were removed due to poor performance in the comprehension questions (i.e. below 75% accuracy). All methodological procedures followed those established in Experiment 1 and Experiment 2.

Statistical analysis was carried out the same way as in Experiment 3. We analysed the RT measurements on six critical regions: Subject NP, the predicate, the ILP, and three spillover regions.

RT patterns for all critical regions in the Past Adverbial condition are illustrated in Figure 3.13, and the Unmarked condition in Figure 3.14. We observed a

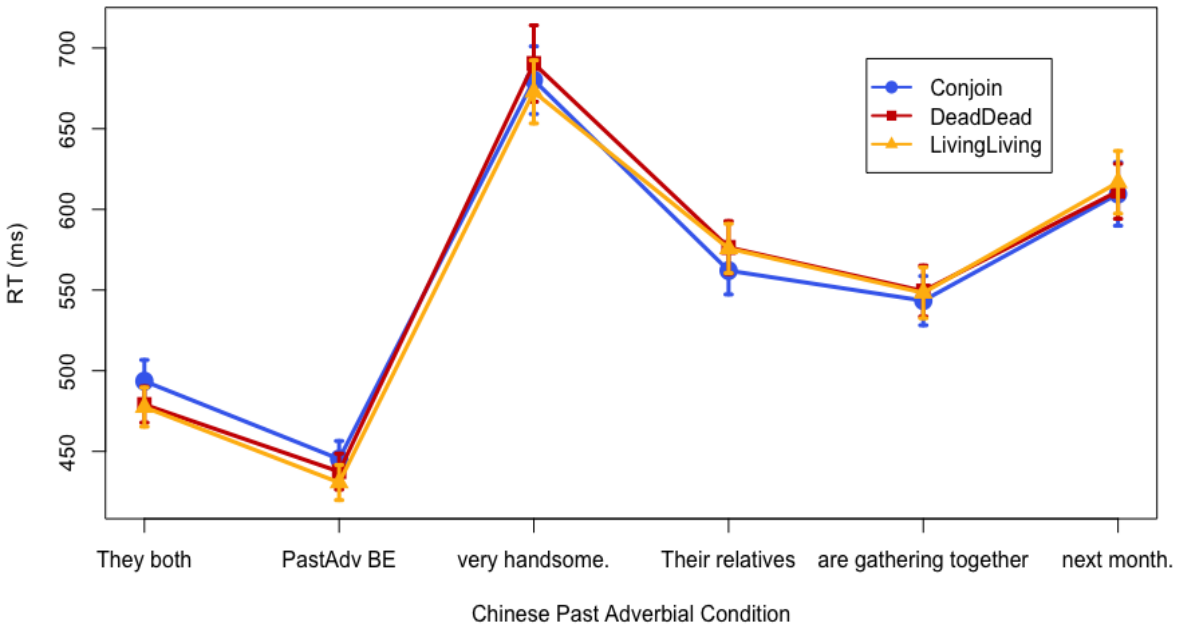

Figure 3.13: Experiment 4: Chinese past – RTs on critical regions

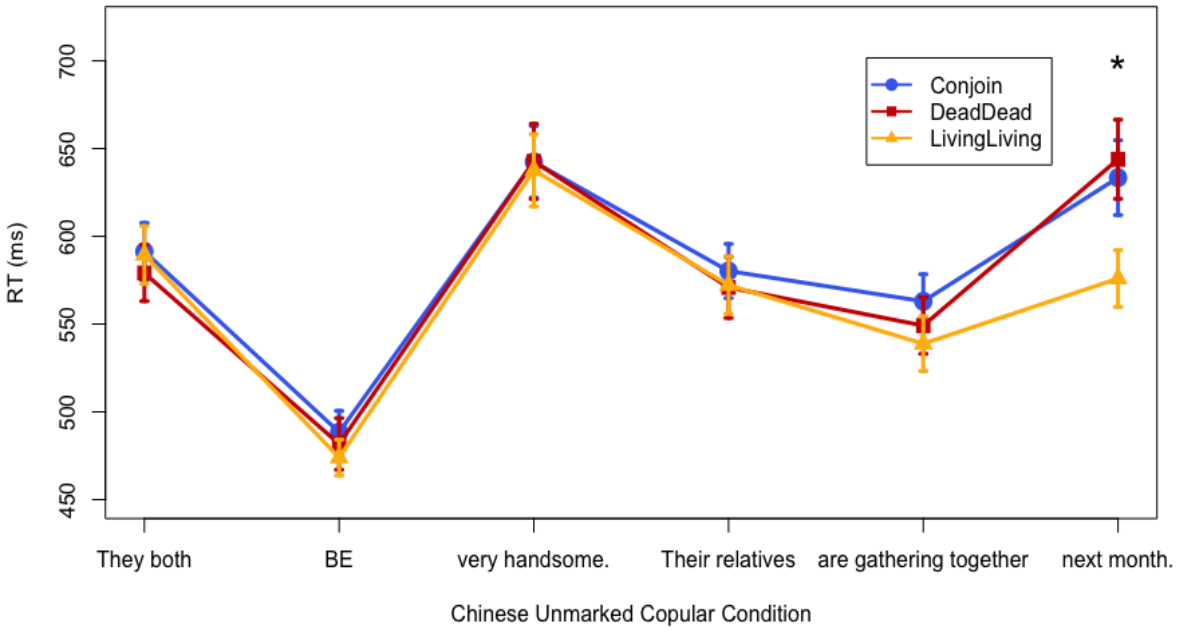

Figure 3.14: Experiment 4: Chinese unmarked – RTs on critical regions

null effect of subject type in the Past Adverbial condition, just as the English past tense condition in Experiment 3. However, in the Unmarked condition, RTs for the Conjoin condition and the Dead-Dead condition were 57ms and 68ms longer than the Living-Living condition respectively on the third spillover region, resembling the *verbal tense effect* in English which also occurred on the same region. RTs for all critical regions in the Unmarked condition are summarised in Table 3.10 (parentheses represent standard error by participants).

	Subject	PRED	ILP	Spillover 1	Spillover 2	Spillover 3
Conjoin	591(16)	488(12)	642(20)	580(15)	563(15)	633(21)
Dead-Dead	579(16)	482(15)	643(21)	571(17)	549(16)	644(23)
Living-Living	589(17)	474(10)	638(21)	572(16)	539(16)	576(16)

Table 3.10: Experiment 4: Chinese unmarked – RTs (ms) on critical regions

On the third spillover region, linear mixed effect model revealed no significant interactions between tense and subject type in the full model, although the first contrast was trending toward statistical significance. Raw RTs were plotted in Figure 3.15 showing the mean values, the 95% confidence intervals, and the data distribution. RTs in the linear mixed effect model were plotted in Figure 3.16. The two tense conditions were sum coded. For the three subject type conditions (i.e. LDC), the first contrast was between Living-Living and Dead-Dead & Conjoin (i.e. *verbal tense effect*), and the second contrast between Dead-Dead and Conjoin (i.e. *nominal tense effect*).

Planned comparison revealed that in the Unmarked condition, the first contrast reached significance ($t = 2.210$, $p < .05$), suggesting that the overall null effect in the full model was driven by a null effect in the Past Adverbial condition (see Table 3.11). Both Conjoin and Dead-Dead conditions elicited significantly longer RTs compared to the Living-Living condition, showing a *verbal tense effect* just as observed in the English present tense.

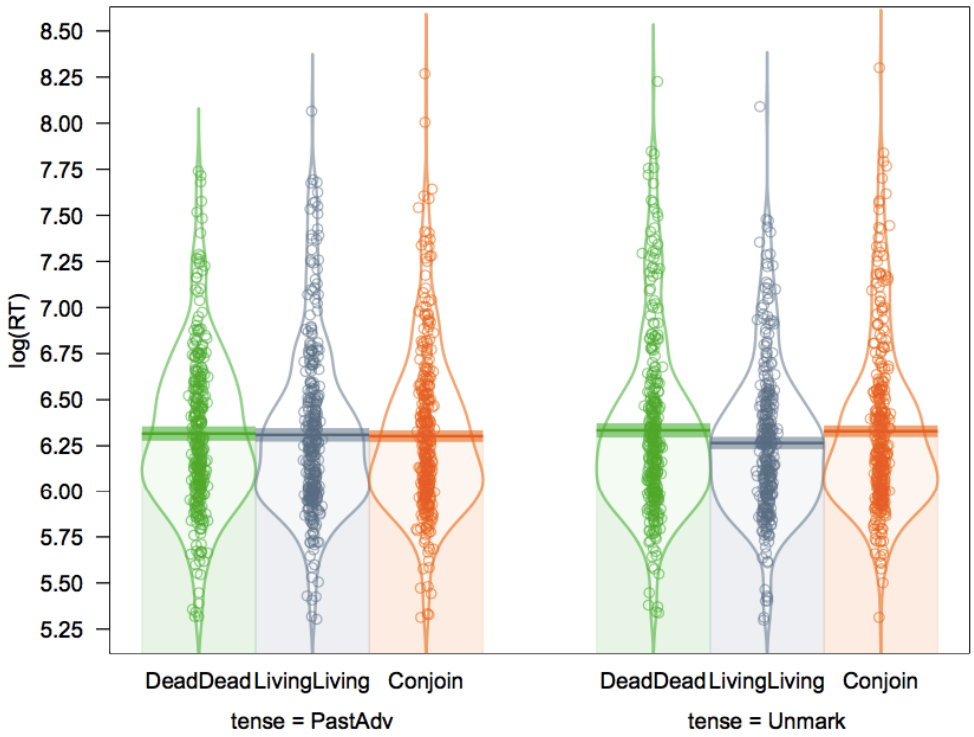

Figure 3.15: Experiment 4: Chinese unmarked – CIpirate plot for RTs on spillover

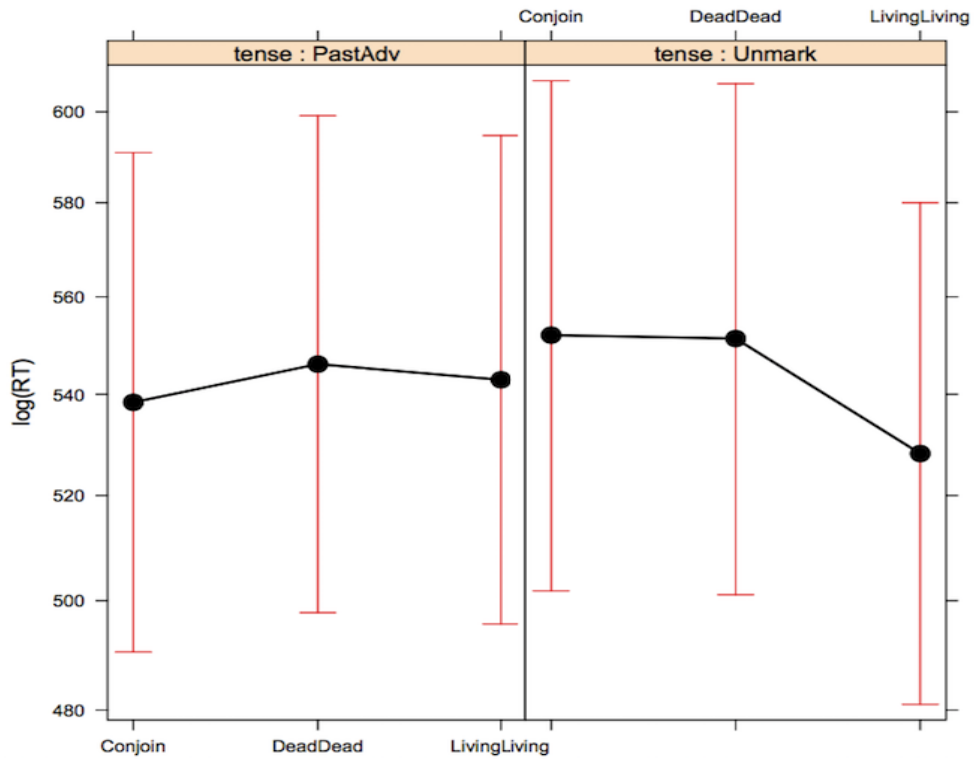

Figure 3.16: Experiment 4: Chinese unmarked – Effect plot for RTs on spillover

	Estimate	Std. Error	df	t value	Pr(> |t|)
(Intercept)	6.301	0.045	73.070	140.084	< .001 ***
verbal	0.032	0.014	105.300	2.210	< .05 *
nominal	-0.001	0.015	32.040	-0.057	.955

Table 3.11: Experiment 4: Chinese unmarked – Planned comparison on spillover

Discussion

Recall that in Experiment 2, the Chinese bare predicate sentences were judged as equally acceptable regardless of the subject type. In Experiment 4, however, as the process of computing lifetime effects unfolds in time, we once again observed a *verbal tense effect*. This result is interesting in at least two respects: it first suggests that Chinese is unlikely to be completely tenseless, but probably does possess some kind of tense system. Secondly, the discrepancy between the offline data in Experiment 2 and the online data in Experiment 4 calls for a model that can bridge the offline judgement results and the online processing patterns. We will elaborate on this in Chapter 4.

Meanwhile, in the Past Adverbial condition, we also observed a null effect of subject type just as in the English past tense. This adds to the possibility that processing temporal information in the past context involves extra cognitive load, making it difficult to detect any nuanced differences during online comprehension.

In sum, the processing of lifetime effects revealed a symmetrical pattern between English and Chinese, which can be explained by assuming a Future/Non-Future tense distinction in Chinese and an "online update" process during real-time language comprehension. Chapter 4 is devoted to outlining this process and demonstrating how it captures the processing patterns observed in Experiments 1-4.

Chapter 4

General Discussion

The goal of this chapter is to answer two keys questions based on the experimental evidence: (i) Is Chinese truly tenseless? If not, what kind of tense system does it have? (ii) Given the difference between English and Chinese in terms of temporal interpretation, how do speakers from these two languages process lifetime effects differently? What kind of incremental model can capture the processing patterns in both languages? Ultimately, we propose a model that bridges the offline and online processing patterns, providing a framework for analysing the processing of tense cross-linguistically.

This chapter is organised as follows: Section 4.1 first discusses the offline judgement data from Experiment 1 and Experiment 2, which leads to the conclusion that there is no covert tense node for a Past/Non-Past distinction in Chinese. Based on this, we further suggest that the Chinese bare predicate is likely to possess a non-future tense. Section 4.2 describes our proposal for an incremental update process during online language comprehension, and Section 4.3 applies this model to our analysis of the self-paced reading data from Experiment 3 and Experiment 4, where we show that an "online update" process can capture the nominal tense effect in English (and the lack thereof in Chinese) as well as the verbal tense effect observed in both

languages.

4.1 The Chinese Tense System

Previous theoretical work on "tenseless" languages has largely succeeded in capturing the syntax and semantics of "tenselessness" while acknowledging these languages' capability of expressing temporal relations despite the lack of overt tense marking. Specifically for Chinese, theoretical debate on whether this language has a covert tense continues into the present day. These debates agree on the definition of "tenselessness" as lacking not only overt morpho-syntactic marking of the past tense, but also a semantic tense "restricting the value of the reference time pronoun" (Bochnak, 2016, p. 277), focusing on the existence of a tense node that provides a mechanism for checking [PAST] and [NONPAST] features. Nevertheless, arguments for and against a tensed analysis of Chinese have mainly been built on indirect evidence (e.g. whether Chinese has a finiteness distinction, which may stem from a T node). The current study provides evidence against the view that there is a covert past tense in the syntax of Chinese, and further argues that the Chinese bare predicate has a non-future tense.

To begin with, our results from acceptability judgement studies show that there is no Past/Non-Past distinction in the Chinese tense system, be it overt or covert. In Experiment 1 and Experiment 2, we observed an asymmetrical judgement pattern between English and Chinese: while English speakers judged sentences with contradictory lifetime inferences as significantly less acceptable than sentences with matching temporal information, Chinese speakers did not seem to find these sentences problematic. Results in the English acceptability judgement study were predicted by Mittwoch's presuppositional account of lifetime effects: since English has a Past/Non-Past tense system, the copular *be* is sensitive to the [PAST]/[NONPAST] feature distinction, making both tenses inappropriate when an ILP is combined with

one living and one dead individual in the subject position, but the past tense shows a less robust effect due to its contextual dependency in English. Meanwhile, results from Experiment 2 showed a null effect in the Chinese bare predicate sentences: all three subject type conditions are judged as equally acceptable when the sentence contains only *shi* or *you*, which is consistent with a theory that does not assume a covert past tense in Chinese. This provides strong evidence that the Chinese bare predicate, unlike its counterpart in English, is not sensitive to the Past/Non-Past distinction at all.

There is, however, a potential alternative explanation: perhaps this conflict of tense features in contradictory lifetime inferences does exist, but it is resolved at the morpho-phonological level because the Chinese bare predicate is a neutralised form of the two tense features.[1] To explain this idea, consider the following example in English:

(71) John thinks that *they/you* , and Mary is quite sure that *you/they*, *are* going to be late.

Here, the conjunctive construction is grammatical because the second person singular pronoun and the third person plural pronoun share an identical morph-phonological form, such that the conflict of features is resolved and does not lead to ungrammaticality (Pullum & Zwicky, 1986). However, note that this example can be analysed as a right node raising construction, which licenses tense mismatches when the two conjuncts have different tenses, because the second conjunct in fact controls the tense morphology on the shared copular. Now compare (72) and (73):

(72) #Chomsky$_{living}$ and Saussure$_{dead}$ are linguists.

(73) ??Saussure$_{dead}$ and Chomsky$_{living}$ are linguists.

[1]I thank Norbert Hornstein, Omer Preminger, Irene Heim, and E. Matthew Husband for their very insightful comments on this alternative explanation.

If a native speaker is forced to choose between these two, (73) will be preferred over (72), although neither is perfectly grammatical. This suggests that in English, the second conjunct is more in control of tense agreement (Bošković, 2004; Cann, Kempson, Marten, & Otsuka, 2005). How is this relevant to tense in Chinese? The idea is that perhaps *shi* or *you* is just controlled by the second conjunct and gets a temporal feature only from the second NP in the subject, but it doesn't then follow that there could not be tense features from these examples of right node raising constructions. That evidence must come from somewhere else. Therefore, this alternative explanation falls out of our consideration, and our conclusion about the lack of [PAST]/[NONPAST] feature distinction in Chinese still holds.

By comparing results from Experiment 1 and Experiment 2, we can safely arrive at the conclusion that English and Chinese do have different tense systems, in the sense that there is a Past/Non-Past distinction in English but not in Chinese. However, we still cannot conclude that Chinese is completely tenseless, since offline measures do not rule out the possibility that Chinese has a tense node with a Future/Non-Future distinction. In fact, results from Experiment 4 rule out the hypothesis that Chinese is completely tenseless and provide evidence for the existence of a tense node in this language. If the Chinese bare predicate does not make any kind of tense distinction, then we would not expect to see any processing difficulty during the online comprehension of lifetime effects in Chinese, aligning with the offline processing measures obtained in Experiment 2. However, Experiment 2 and Experiment 4 show a discrepancy between the offline and online measures: results from Experiment 4 revealed a *verbal tense effect* suggesting that, as the process of computing temporal information unfolds in time, bare predicate sentences with one living and one dead individual – which presumably do not give rise to contradictory lifetime inferences in Chinese – also elicited longer RTs, just as their counterparts in the English present tense. This effect, which occurred on the same region in both languages, cannot be

explained if Chinese is completely tenseless. We will further elaborate on this point in the upcoming section with a detailed analysis of the online processing data.

Further evidence suggests that Chinese probably does have a Future/Non-Future tense system. First of all, Chinese does seem to have a promising candidate, *jiang*, as a future tense morpheme (Z. N. Huang, 2015). Secondly, our intuition about "forward lifetime effects" (Arche, 2006) suggests that when the subject contains one living and one yet-to-be-born individual, the use of *shi* alone also leads to infelicity. Consider first an example of "forward lifetime effects" in English:

(74) Holly, a British actress, will give birth to her first baby in New York. Her assistant, Georgia, had her baby in California last month. Both of their babies #are American citizens.

Given the same lifetime information, the last sentence is equally infelicitous in Chinese with the bare copular *shi*:

(75) ta-men de xiaohai dou #shi meiguo gongmin
3PL POSS child DOU BE America citizen
'Their babies both #BE American citizens.'

This intuition is backed up by some preliminary data which shows that there is a numerical trend for lower ratings for sentences with contradictory forward lifetime inferences in Chinese. Although a full examination is required, this pattern lends further support for the view that bare predicates in Chinese project a T node with the [NONFUTURE] value.

It is perhaps worth mentioning that the results from the Past Adverbial condition with *ceng* 'once' also revealed some interesting results. In Experiment 2, *ceng* 'once' shows the same pattern as the English past tense, in which contradictory lifetime inferences received lower acceptability ratings. This suggests that lifetime effects do arise in the past context, but it cannot be attributed to a tense node since it is

confounded with the past adverbial, which can also function to restrict the location of reference time, contributing a [PAST] feature to the logical form. By comparison, the English past tense sentences can be thought of as having an optional, implicit adverbial *once*, since English *was* is capable of contributing a [PAST] feature by itself. Moreover, in Experiment 4, during the online processing of Chinese past adverbial sentences, we once again observed a null effect of subject type just as in the English past tense, which seems to be due to a ceiling effect for discourse comprehension in the past context in both languages.

In sum, offline processing results from Experiment 2 rule out the possibility that there is a Past/Non-Past tense distinction in Chinese, and online processing results from Experiment 4 suggest that Chinese is not likely to be completely tenseless but probably has a tense system that is different from English. Finally, our observation and preliminary investigation of "forward lifetime effects" support the idea that Chinese has a Future/Non-Future tense distinction, with the bare predicate projecting a tense node with the [NONFUTURE] value.

4.2 A Model for "Online Update" Process

In this section, we describe the model that we have developed for capturing the incremental process of lifetime information during online language comprehension. This model is motivated by two factors. First of all, there is an empirical need to bridge the potential discrepancy between offline and online processing patterns as observed in the four experiments. In particular, both English and Chinese speakers seemed to have encountered processing difficulty as they read sentences with contradictory lifetime inferences, yet the end product of online processing led to a penalty in the offline measures only in English but not in Chinese. This tension cannot be resolved in any current theoretical or processing model of Chinese tense, but needs to be ac-

counted for by taking a dynamic view of computing temporal information in real time. Secondly, in the English self-paced reading study (i.e. Experiment 3) we observed a nominal tense effect, followed by a verbal tense effect, whereas in the Chinese self-paced reading study (i.e. Experiment 4) we only observed a verbal tense effect on the same region. It is therefore necessary to explain the order of the two effects in English, as well as the lack of the nominal tense effect in Chinese, which is a somewhat surprising finding: given the lack of overt past tense marking on Chinese predicates, one would postulate that Chinese speakers might pay more attention to any potential conflict of temporal features in the nominals, but this postulation does not seem to be borne out in the online processing results.

To this end, we propose a model that addresses the question of how lifetime effects are incrementally processed during online language comprehension, capturing the differences as well as commonalities between English and Chinese tense systems.

The basic idea of our model, although developed independently, shares the flavour of Bittner's proposal of "online update", which states that "the surface string is interpreted as is, with each morpheme in turn updating the current state of information and attention" (Bittner, 2007a, p. 363). In her proposal, Bittner first offers detailed arguments against a static view of semantics, as inherited in the traditional Montague Grammar, and then advocates for the view that semantic composition is a dynamic process which respects direct surface order, a view that has earned considerable attention since the development of Dynamic Semantics in the early 1980s. Crucially, the idea of incremental update is enlightening for discourse processing, and by adopting this framework, one may gain insights into the evidence we have obtained from our experimental take on the processing of tense.

While Bittner's framework is motivated by an attempt to account for temporal, modal, and *de se* anaphora in a polysynthetic language (i.e. Kalaallisut), our analysis focuses on incremental update processes in the temporal domain. Following the

conventions in previous work, we will use τ to represent times as a type of discourse referent, x to represent individuals, and e to represent states/events. In addition, two functional types are of relevance here, namely nominal types and verbal types: states/events are of verbal types whereas individuals are of nominal types, both of which can be an argument of τ.

Proper names and pronouns that refer to individuals are what Tonhauser (2000) calls *inherent property nouns*, which denote properties that are true for the lifetime of an individual. To express the temporal properties of these nominals, Tonhauser (2000) further proposes a lifetime function **lt(x, t')**, where the first argument identifies an individual and the second contains the interval during which the individual is alive. Being a function that expresses a relation between an individual x and their lifetime interval t', the lifetime function is language-independent and can be used for both English and Chinese. In our model, we formally represent the life span of an individual as τ(x), and the time course of the property denoted by a predicate as τ(e). Crucially, ILPs require a maximal match between τ(e) and τ(x), i.e. between the temporal interval of a predicate and the lifetime interval of an individual:

(76) MAX(τ(e), τ(x))

This maximal match relates to Musan's (1997) idea that predicates provide "lexically determined minimal requirements" on their arguments' lifetimes (p. 271). On the other hand, SLPs do not have such a requirement, but simply need the temporal interval of a predicate to be contained in the lifetime interval of an individual:

(77) τ(e) $\subseteq$ τ(x)

We now apply the basics of this model to sentences with (contradictory) lifetime inferences. In a dynamic view of semantic composition, tenses and pronouns may either introduce new information about the Topic Time or a nominal antecedent, or anaphorically retrieve discourse referents from previous contexts. The type of

context under investigation here is very specific – sentences with lifetime inferences which begin with a plural pronoun:

(78) This house was built for Bill Stevens, the actor, who died last year. The one over there belonged to his brother, John Stevens, the property tycoon; he now lives in America. They #are / ??were both very handsome.

The "online update" process involves two stages: forming a semantic representation, and then incrementally updating it with discourse information. That is to say, the plural pronoun *they* in the critical sentence first forms a semantic representation denoting the union of the lifetimes of two individuals:

(79) $\tau(\text{they}) = \text{lf}(x_1, t'_1) \cup \text{lf}(x_2, t'_2)$

They then anaphorically retrieves two discourse referents – Bill and John – from the context, incrementally updating its representation based on the discourse information. Proceeding to the tensed copular *be*, parsers first establish a semantic representation with reference to a temporal interval denoted by the copular, which of course depends on the tense system of the particular language under consideration. Parsers then encounter the ILP in the critical sentence. Recall that ILPs require a maximal match between temporal intervals of the predicate and the individual, in this case τ(e) and τ(they):

(80) $\textsc{max}(\tau(\text{e}), \tau(\text{they}))$

When parsers reach the end of the critical sentence, having received all relevant information about *they*, the copular be, and the maximal match requirement of the ILP, they first initiate a semantic representation of the temporal interval of the plural pronoun:

(81) $\tau(\text{they}) = \text{lf}(\text{John}, t'_{John}) \cup \text{lf}(\text{Bill}, t'_{Bill})$

This semantic representation then undergoes an update process, during which parsers check whether it is consistent with the temporal information of each individual stated in previous discourse:

(82) $\tau(\text{John}_{living})$
$\tau(\text{Bill}_{dead})$

This process involves necessary steps for the potential arise of nominal tense effect.

Secondly, parsers form a representation under the maximal match requirement and compare this with the temporal interval denoted by the copular. This representation then also undergoes the update process, where parsers check for the consistency between three maximal match relations, i.e. that for the plural pronoun and each of the individuals denoted by the pronoun:

(83) $\textsc{max}(\tau(\text{e}), \tau(\text{they}))$
$\textsc{max}(\tau(\text{e}), \tau(\text{John}_{living}))$
$\textsc{max}(\tau(\text{e}), \tau(\text{Bill}_{dead}))$

Thus the verbal tense effect may arise as a result of inconsistency between these three maximal match relations, i.e. when these relations with NOW are inconsistent between themselves.

This model makes several predictions. First of all, the model predicts that the arise of these online effects is only possible with ILP, where the maximal match requirement on τ(e) and τ(they) is imposed; without such a requirement, τ(they) also cannot be taken to mean the union of two individuals' lifetimes. Thus the model further predicts that SLPs will not give rise to any of the effects to be described below. Secondly, it correctly predicts that verbal tense effects occur after nominal tense effects during the two-step update process, which is indeed borne out in our results. Finally, the model also predicts that the extra cost involved in processing lifetime effects may come from a clash of temporal intervals when establishing seman-

tic representations and computing discourse update, in which case an offline penalty is expected. However, it may also be a result of taking extra steps in the "online update" process, in which case online processing difficulty does not necessarily lead to lower acceptability ratings. Therefore, our model offers a potential way to bridge the discrepancy between offline and online processing measures.

We now provide a detailed analysis to show how this "online update" model can capture the processing of lifetime effects in both English and Chinese.

4.3 Processing Lifetime Effects

We now provide an account of the nominal tense effect and verbal tense effect in the self-paced reading studies by applying the model described above. Since we only observed effects in the English present tense and the Chinese bare predicate sentences, our analysis will focus on these conditions with reference to (78), with illustration in Figure 4.1 which we will explain step by step. For the sake of brevity, we will only discuss the Conjoin condition where contradictory lifetime inferences arise, since effects from the Dead-Dead condition can be explained in precisely the same way.[2]

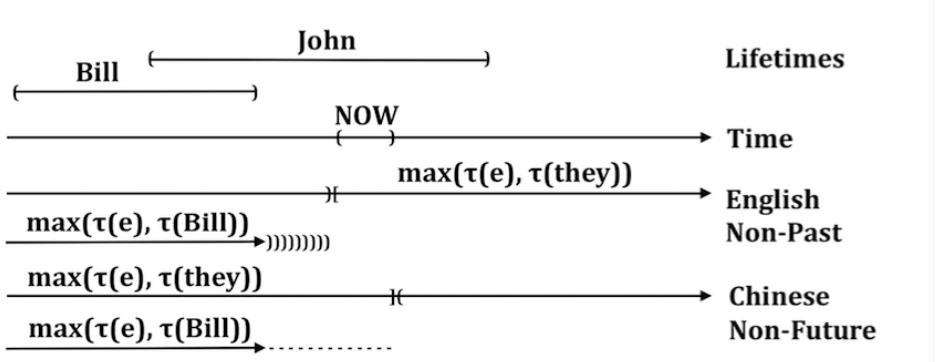

Figure 4.1: Temporal intervals in the Conjoin condition

English and Chinese have distinct tense systems, with English making a Past/Non-

[2]Interested readers may refer to Figure 4.3 for an illustration of the analysis for the Dead-Dead condition.

Past distinction and Chinese a Future/Non-Future one. To informally represent these distinct systems, we have proposed a temporal interval NOW which marks the boundary between Past and Non-Past in English but Future and Non-Future in Chinese; the relevance of this interval will become clear as we explain the contribution of tense during incremental processing. To begin with, recall that the semantics of a bare predicate does not actually specify whether NOW is contained in τ(e). However, the non-past tense in English further implicates the present since the future is typically expressed by means of auxiliaries or syntactic constructions (e.g. *be going to*). Thus English *are* ultimately implicates a temporal interval that includes NOW and extends into the future, such that this interval is contained in τ(e):

(84) NOW $\in \tau$(e)

Meanwhile, Chinese *shi* allows the relation between NOW and τ(e) to remain underspecified; bearing a null non-future tense, *shi* itself does not further implicating the present or the future:

(85) NOW ? τ(e)

As described in Section 4.2, when processing the critical sentence with contradictory lifetime inferences, parsers first form a semantic representation of the plural pronoun *they* – τ(they) – whose relation with NOW is yet to be updated. As parsers proceed to the copular and the ILP, a semantic representation under the maximal match requirement is formed:

(86) NOW $\in$ MAX(τ(e), τ(they))

This leads to an update of the representation of *they*, for English *are* and Chinese *shi* respectively:

(87) English *are*: NOW $\in \tau$(they)

Chinese *shi*: NOW ? τ(they)

Parsers now initiate an "online update" process, first retrieving information about the lifetimes of two individuals from earlier contexts: John is alive whereas Bill is dead. Since the materials were translated from English to Chinese, this piece of discourse information can be regarded as equivalent between the two languages:

(88) NOW $\in \tau(\text{John}_{living})$

NOW $\succ \tau(\text{Bill}_{dead})$

Since τ(they) denotes the union of the lifetimes of John and Bill, we can derive NOW $\in$ τ(they), which conflicts with the relation between NOW and the lifetime of the dead individual, NOW $\notin \tau(\text{Bill}_{dead})$. This inconsistency gives rise to the *nominal tense effect*. In Chinese, however, because the relation between NOW and τ(they) remains underspecified, no contradiction of temporal information is expected on the nominals. This explains the nominal tense effect in English and the lack thereof in Chinese.

We now turn to the verbal tense effect, which arises in both English *are* and Chinese *shi*. Recall that in both languages, NOW is contained in the interval denoted by the maximal match between τ(e) and τ(they), which undergoes an "online update" process where the temporal relation is found to be inconsistent with the dead individual:

(89) NOW $\in$ MAX(τ(e), τ(they))

NOW $\in$ MAX(τ(e), $\tau(\text{John}_{living})$)

NOW $\notin$ MAX(τ(e), $\tau(\text{Bill}_{dead})$)

This inconsistency between the above relations appears costly online and is reflected in reading time disruptions, giving rise to the verbal tense effect observed in both English and Chinese. However, the detail of this processing cost differs across these two languages, hence the asymmetrical pattern in offline measures. To be more spe-

cific, the extra cost involved in the processing of lifetime effects may come from a clash of temporal intervals when establishing incremental representations during the "online update" process, in which case an offline penalty is expected. This is the case in English: the "online update" process results in a clash of temporal intervals due to the Past/Non-Past distinction, where MAX(τ(e), τ(they)) and MAX(τ(e), τ(Bill$_{dead}$)) have no overlap at all, leading to online processing difficulty as well as offline unacceptability. On the other hand, the processing cost in Chinese is a result of extra computation steps during the "online update" process, in which case online processing difficulty does not necessarily lead to lower acceptability ratings: the discourse representation of MAX(τ(e), τ(they)) is contained in the interval denoted by its semantic representation, which is then updated to not include NOW given MAX(τ(e), τ(Bill$_{dead}$)). Crucially, this updated representation is still consistent with Non-Future interval denoted by the bare predicate, and therefore appears costly online but does not ultimately lead to any penalty in offline processing measures.

For the sake of clarity, the entire process of "online update" for the Conjoin condition and the Dead-Dead condition is further illustrated in Figure 4.2 and Figure 4.3 respectively.

4.4 The Processing of Tense: Some Final Remarks

To summarise, in this dissertation we first argue, based on evidence from four psycholinguistic experiments, that the Chinese bare predicate has no covert past tense but is sensitive to a Future/Non-Future distinction. Moreover, since some of our stimuli also involve ILPs containing *you* 'have/possess', this finding is also in line with Li's (2016) and Sun's (2014) argument that the TP in Chinese has a NONFUT value, extending our conclusion to presumably all bare predicates in Chinese. In addition, we offer an incremental model that involves an "online update" process to capture

Figure 4.2: Online update process in the Conjoin condition

Figure 4.3: Online update process in the Dead-Dead condition

the processing of temporal information in languages with distinct tense systems.

The current study also presents several new findings about the processing of tense in general. First of all, previous theoretical discussions about lifetime effects in Indo-European languages focus mostly on lifetime inferences from the past tense, which is somehow considered more "dramatic" or "newsworthy" since death is a more salient piece of information. However, our findings suggest, although perhaps counter-intuitively, that lifetime inferences from the English present tense – which is semantically non-past – is actually more robust since the interval NOW strictly rejects intervals that are in the past, e.g. those denoted by deaths.

Secondly, we observed a discrepancy between the online and offline processing patterns in Chinese, which is interesting as it goes against the common doctrine that offline measures are a reflection of online processing difficulty, or that online processing difficulty always leads to infelicitous judgement. We typically think of offline processing measures as the outcome of language processing and thus in general reflect online processing difficulty, but our results show that this is not necessarily the case: online processing difficulty may be a result of extra computational steps in the incremental process, in which case no penalty in offline judgement would necessarily derive. A language comprehension model that assumes an "online update" process can explain such a discrepancy.

Finally, the past contexts in both English and Chinese showed a ceiling effect during the online processing of lifetime effects. This null effect deserves some attention since (i) it is somewhat unexpected, given the statistically reliable results in acceptability judgement tasks; (ii) the same ceiling effect has been replicated in both languages by using different experimental materials. In fact, in a study of the tense agreement violation, Roberts and Liszka (2013) also report that the English past tense elicited longer reading times across the board in a self-paced reading paradigm, giving rise to a null effect that was successfully obtained in the present perfect con-

dition. This further supports the hypothesis that past context in general requires extra processing effort, making it difficult to observe any nuanced effect of temporal agreement errors during online comprehension.

Upon reflection, the current study can be improved in several ways. In terms of the methodology, due to the limited time and resources, all data collection was carried out on the internet rather than in a lab setting. Although it has been shown that the quality of data produced on MTurk is comparable to lab experiments, potential pitfalls persist. For example, since psycholinguistic studies tend to be underpowered and often depend on small differences in reaction times, previous research has cast doubt on whether precise timing measurements can be gathered on the internet (Enochson & Culbertson, 2015; Munro et al., 2010; Schnoebelen & Kuperman, 2010). Our experience with data collection on MTurk also shows that reliable patterns can be produced online, but it would normally require a much larger number of participants to reach the same effect size as a lab experiment. Ideally, results from the current study (particularly the Chinese self-paced reading study) need be replicated in order to provide stronger support for the conclusions.

Chapter 5

Conclusions and Implications

In this dissertation, we have investigated the processing of lifetime effects in English and Chinese by adopting two psycholinguistic techniques, i.e./ acceptability judgement and self-paced reading. To reiterate, our research questions are essentially two-folded: (i) Is Chinese truly tenseless? If not, what kind of tense system does it have? (ii) What kind of model can best capture the offline and online processing patterns observed? To this end, we have presented experimental evidence to show that (i) the Chinese bare predicate has no covert past tense but is sensitive to a Future/Non-Future distinction; (ii) the discrepancy between offline and online processing patterns supports a dynamic model of processing temporal information, which involves an incremental update process during online language comprehension. The following paragraphs discuss some implications that can be borne out from these two key findings.

First of all, we investigated the issue of (contradictory) lifetime effects in Chinese – traditionally known as a "tenseless" language – by adopting an experimental approach. The current study provides evidence supporting the view that there is a tense node in the syntax of Chinese which makes a Future/Non-Future distinction; specifically, the bare predicate projects a tense node with the [NONFUTURE] value. Results

from an acceptability judgement task reject the hypothesis that there is a covert tense in Chinese which makes a Past/Non-Past distinction. Subsequent findings from self-paced reading studies, along with theoretical arguments and preliminary results of "forward lifetime effects", further pins down the details of the Chinese tense system: it is not completely tenseless but possesses a phonologically null non-future tense, which is typologically rare (Comrie, 1985; Z. N. Huang, 2015).[1] A more solid understanding of the Chinese non-future tense requires further empirical investigation; we will soon turn our full attention to the psycholinguistics of "forward lifetime effects" in Chinese, which we hope can confirm the patterns revealed in our preliminary data collection. In addition, one may further ask if the processing of (contradictory) lifetime effects in other "tenseless" languages will yield the same result. If not, what would the differences suggest for "tenseless" languages in general? Even more interesting are those languages in which tense is claimed to be optionally marked, such as Washo (Bochnak, 2016), which would provide invaluable insights into the diachronic development of tense systems. Do contradictory lifetime inferences arise in tense-optional languages? Would they resemble tensed languages or "tenseless" languages in terms of temporal interpretation? Of course, languages cannot be easily classified into dichotomous categories such as *tensed* and *tenseless*, but what lies between these two ends remains largely unexplored and merits further investigation.

Secondly, to account for the order of two different effects observed during online processing, and to explain the discrepancy between offline and online processing patterns in Chinese, we have proposed a model which supports the idea that the online representation of tense involves an incremental update process. Essentially, this model offers a potential bridging theory between language processing and the end product thereof, taking into account the fact that online and offline processing patterns may disassociate at the surface. More importantly, the online update model

[1]See Smith, Perkins & Fernald (2007) for a Future/Non-Future analysis on Navajo, and C. F. Chen (2011) for a Future/Non-Future analysis of Rukai.

is capable of capturing the differences as well as commonalities between typologically distinct languages. As Bittner (2003) insightfully puts it, "for only uniform surface dynamics can explain the universal context-setting role of order, in every language and at every level" (p. 26).

Finally, while the current study investigates the processing of tense – as defined in morpho-syntactic terms – in merely two languages of the world, our findings are informative for developing a general theory of tense in the broad sense, perhaps even as a linguistic universal. Human languages have the property of "displacement", enabling us to talk about events beyond "here and now" (Chafe, 1992; Hockett, 1960), but the expression of time is realised differently across different languages. The existence of superficially "tenseless" languages challenges the empirical motivation for TENSE as a universal functional category in the Principles and Parameters framework in its Minimalist incarnation (Ritter and Wiltschko, 2014). However, the current study suggests that Chinese, and perhaps other so-called "tenseless" languages as well, possesses a tense system that distinguishes Future from Non-Future. This view challenges the commonly-held misconception about tense as a split between Past and Non-Past, which perhaps results from the focus on Indo-European languages in previous literature. A class of "tenseless" languages must be scrutinised with new care. The re-analysis of "tenseless" languages is worth pursing as it has an even broader bearing on certain fundamental issues, such as whether Tense Phrase is indeed a universal syntactic category. Moreover, while tense has traditionally been regarded as a category of verbs, following a research program initiated by Abney (1987), recent cross-linguistic studies show that nominals can also encode temporal information and may involve a Tense Phrase in their hierarchical structure (Ilkhanipour, 2015; Nordlinger and Sadler, 2004a, 2004b). The current study fits into the research agenda of identifying universal functional categories and the range of variation these categories allow for (Ritter and Wiltschko, 2014).

Time is an immediate and fundamental human experience, "a universal constant" stored in our linguistic system. As such, temporal relations are given as "part of our world knowledge" (Klein, 1994, p.121). Tense as a potential structural universal is a window into the human language; in particular, languages with distinct tense systems, such as English and Chinese, provide invaluable insights into the processing of tense and how it reflects discourse update as a dynamic process, with this study being merely a preliminary sketch. Building on results from the current study, future research can empirically test for the Future/Non-Future distinction in Chinese and other superficially "tenseless" language, contributing to debates concerning whether TENSE is a universal category and, perhaps more fundamentally, what evidence is required to identify universal functional categories. A principled investigation into these questions is now underway.

Appendix A

Summary of tenseless languages

	Mandarin Chinese	St'át'imcets	Paraguayan Guaraní	Yucatec Maya	Hausa
Formal analysis	J. W. Lin (2003); Z. N. Huang (2015)	Matthewson (2006)	Tonhauser (2010, 2011)	Bohnemeyer (2009)	Mucha (2013)
No overt PAST or PRES tense morpheme?	✓	✓	✓	✓	✓
All three temporal readings available in unmarked matrix clauses?	× (no future reading)	× (no future reading)	× (no future reading)	✓	✓
Simultaneous PAST and PRES events?	✓	✓	N/A	N/A	×
Covert tense for Past/Non-Past contrast?	×	×	×	×	×
Future reference without future marker?	× (future marker *jiang/hui*)	× (future marker *-kelh*)	× (future marker *-ta*)	✓	✓
Future/Non-Future tense?	✓	✓	✓	×	×

Table A.1: Brief summary of five tenseless languages

Appendix B

Experimental materials in English

Item	Info	Living-Living	Dead-Dead	Conjoin
1	Lifetime	This house was built for John, who is a local real estate agent in town. The one over there belongs to his brother, Bill, who now lives in Europe.	This house was built for John, who passed away last year. The one over there belonged to his brother, Bill, who lived his whole life in Europe.	This house was built for John, who passed away last year. The one over there belongs to his brother, Bill, who now lives in Europe.
	Tense	They are/were both very handsome.		
	Spillover	Their relatives are gathering together next month for a reunion.		
2	Lifetime	My three-month-old niece Jenny always cries for her mother every time she wakes up. Sadly, her mother had a hard time during childbirth and is still too weak to hold the girl.	My deceased niece Jenny always cried for her mother every time she fell sick. Sadly, her mother died during childbirth and never got to hold the girl.	My three-month-old niece Jenny always cries for her mother every time she wakes up. Sadly, her mother died during childbirth and never got to hold the girl.
	Tense	They both have/had blue eyes.		
	Spillover	Her father is still not sure what he will do.		

3	Lifetime	James, an acclaimed movie director who cheated on his wife, survived in a car accident. His wife Naomi, who is an award-wining actress, was shocked by the news.	James, an acclaimed movie director who cheated on his wife, was killed in a car accident. His wife Naomi, who was an award-wining actress, was also killed in the accident.	James, an acclaimed movie director who cheated on his wife, was killed in a car accident. His wife Naomi, who is an award-wining actress, was shocked by the news.
	Tense	They are/were both Hollywood royalty.		
	Spillover	Her agent will make a statement to the press soon.		
4	Lifetime	Sarah looks extremely upset today at school, and she keeps crying on and off. She had finally left her husband, who has been abusing her for so long.	Sarah looked extremely upset yesterday at school, and committed suicide sometime in the evening. She just lost her husband, who had suffered from lung cancer for a long time.	Sarah looks extremely upset today at school, and she keeps crying on and off. She just lost her husband, who had suffered from lung cancer for a long time.
	Tense	They are/were both high school teachers.		
	Spillover	The school was shocked by the news.		
5	Lifetime	The office building was slightly damaged during the tsunami, but is still functioning. The other building, which is very well-furnished, is now in service.	The office building was completely demolished during the tsunami. The other building, which was very well-furnished, was also destroyed.	The office building was completely demolished during the tsunami. The other building, which is very well-furnished, is now in service.
	Tense	They both have/had twenty floors.		
	Spillover	The planning commission has been reviewing the zoning of that area.		
6	Lifetime	Lucy is a lucky girl and has been through many accidents while exploring the wild. Tim, however, is much less fortunate and was slightly injured by a lightening strike.	Lucy was a lucky girl and had been through many accidents until her last one got her. Tim, however, was much less fortunate and did not survive a lightening strike on his first trip.	Lucy is a lucky girl and has been through many accidents while exploring the wild. Tim, however, was much less fortunate and did not survive a lightening strike on his first trip.
	Tense	They both have/had an adventurous spirit.		
	Spillover	A friend of theirs tells stories about them at the local bar.		

7	Lifetime	Kevin, a convicted murderer, has been sentenced to death by the state. His partner in crime, Paul, is still on the run and lives in misery.	Kevin, a convicted murderer, was executed by the state. His partner in crime, Paul, was still on the run when he fell into a ravine and died.	Kevin, a convicted murderer, was executed by the state. His partner in crime, Paul, is still on the run and lives in misery.
	Tense	They are/were both notorious felons.		
	Spillover	The police are still interested in their cases.		
8	Lifetime	Steven, a basketball coach, works for a local high school in his hometown these days. His son, Vincent, survived a mass shooting in college earlier this year but is now back in school.	Steven, a basketball coach, worked for a local high school in his hometown in his last days. His son, Vincent, was killed in a mass shooting in college earlier this year.	Steven, a basketball coach, works for a local high school in his hometown these days. His son, Vincent, was killed in a mass shooting in college earlier this year.
	Tense	They are/were both NBA fans.		
	Spillover	The town is rather small and close knit.		
9	Lifetime	Judith has enjoyed swimming in a pool since she was little. Every time her father goes swimming, he thinks of her beautiful smile.	Judith drowned in a pool when she was only twenty. Her late father, who was a swimming coach, never recovered from the loss of his daughter.	Judith drowned in a pool when she was only twenty. Every time her father goes swimming, he thinks of her beautiful smile.
	Tense	They are/were both fast swimmers.		
	Spillover	Swimming has always been a part of that family.		
10	Lifetime	Peter just got back from a medical conference in France. His colleague, Mary, survived a head-on collision when she was driving home.	Peter was in a plane crash on his way back from a medical conference in France. His colleague, Mary, was in a fatal head-on collision when she was driving home.	Peter just got back from a medical conference in France. His colleague, Mary, was in a fatal head-on collision when she was driving home.
	Tense	They are/were both forensic scientists.		
	Spillover	Their practice is very concerned about future travel.		

11	Lifetime	Seven years ago, Dale managed to escape a fire when he was at work. His only son, Edward, followed his father's footsteps and has rescued many people.	Seven years ago, Dale didn't escape a fire when he was at work. His only son, Edward, followed his father's footsteps before he too was killed in a fire.	Seven years ago, Dale didn't escape a fire when he was at work. His only son, Edward, followed his father's footsteps and has rescued many people.
	Tense	They are/were both brave firemen.		
	Spillover	Fighting fires is a dangerous line of work.		
12	Lifetime	Nicola is a very strong-minded person, and has managed to resolve every financial crisis. William, however, tried to commit suicide after his company went bankrupt, but was resuscitated.	Nicola was a very strong-minded person, and had managed to resolve every financial crisis in his life. William, however, committed suicide after his company went bankrupt.	Nicola is a very strong-minded person, and has managed to resolve every financial crisis. William, however, committed suicide after his company went bankrupt.
	Tense	They are/were both Wall Street tycoons.		
	Spillover	People like these have a profound impact on world economy.		
13	Lifetime	Gary's dog choked when he mistakenly fed him some walnuts, but he quickly coughed them up. Fortunately, his cat always spits out everything he give her, including the walnuts.	Gary's dog choked to death when he mistakenly fed him some walnuts. Unfortunately, his cat also choked on the walnuts and could not spit them out.	Gary's dog choked to death when he mistakenly fed him some walnuts. Fortunately, his cat always spits out everything he give her, including the walnuts.
	Tense	They are/were both small animals.		
	Spillover	Gary really should have been more careful.		
14	Lifetime	Andy is highly skilled in extreme sports, and enjoys rugged mountain ranges. His best friend Nick got bitten by a deadly snake, although he has now recovered.	Andy was highly skilled in extreme sports, and enjoyed rugged mountain ranges when he was still alive. His best friend Nick got bitten by a deadly snake and is no longer with us.	Andy is highly skilled in extreme sports, and enjoys rugged mountain ranges. His best friend Nick got bitten by a deadly snake and is no longer with us.
	Tense	They are/were both courageous hikers.		
	Spillover	The mountains seem to be very dangerous.		

15	Lifetime	Lily, who works for a clinic, is suffering from accidental prescription drug overdose. Her colleague Jessie is very shocked and also really sorry about the incident.	Lily, who worked for a clinic, died from what appeared to be an accidental prescription drug overdose. Her colleague Jessie seemed shocked, but was later found guilty of murder and was executed.	Lily, who worked for a clinic, died from what appeared to be an accidental prescription drug overdose. Her colleague Jessie is very shocked and also really sorry about the incident.
	Tense	They are/were both top-notch doctors.		
	Spillover	Others at the clinic still cannot believe what happened.		
16	Lifetime	Louise's grandmother calls her every other day because she feels very lonely at home. Last year, her grandfather had a heart attack and now he still needs to be taken care of.	Louise's grandmother used to call her every other day before she passed away. Last year, her grandfather had a heart attack and died at the hospital.	Louise's grandmother calls her every other day because she feels very lonely at home. Last year, her grandfather had a heart attack and died at the hospital.
	Tense	They are/were both loving grandparents.		
	Spillover	Louise wrote a short story about their time in the war.		
17	Lifetime	Kate accidentally got caught in an avalanche but was rescued by a professional team. Her fiancé Xavier is traumatized, and has not been painting much ever since.	Kate accidentally got caught in an avalanche and was never found. Her fiancé Xavier was traumatized, and drowned himself a few weeks later.	Kate accidentally got caught in an avalanche and was never found. Her fiancé Xavier is traumatized, and has not been painting much ever since.
	Tense	They are/were both very talented artists.		
	Spillover	Her paintings still sell for a very good price.		
18	Lifetime	Jeanne has been suffering from health issues as she often has to work for extra hours. Recently, her boss Haley fainted after working overnight for a whole week, and is now hospitalised.	Jeanne died of multiple health issues as she often had to work for extra hours. Recently, her boss Haley was killed by a stroke after working overnight for a whole week.	Jeanne has been suffering from health issues as she often has to work for extra hours. Recently, her boss Haley was killed by a stroke after working overnight for a whole week.
	Tense	They are/were both hard workers.		

	Spillover	Lawyers are investigating the company on their families' behalf.		
19	Lifetime	Yvonne has been diagnosed with leukaemia, and has another 2 years to live at most. Her twin brother, Ian, is now 30 years old and keeps fit by doing regular workout.	Yvonne was diagnosed with leukaemia at the age of 10, and lived for another 2 years. Her twin brother, Ian, was 30 years old when he left this world.	Yvonne was diagnosed with leukaemia at the age of 10, and lived for another 2 years. Her twin brother, Ian, is now 30 years old and keeps fit by doing regular workout.
	Tense	They are/were both Capricorns.		
	Spillover	Their younger brother was also born under the same sign.		
20	Lifetime	Tania impresses everyone with her calmness after all she has been through. Her son, Jack, is risking his life for his country in an overseas war.	Finally, Tania can rest in peace after all she had been through. Her son, Jack, sacrificed his life for his country in an overseas war.	Tania impresses everyone with her calmness after all she has been through. Her son, Jack, sacrificed his life for his country in an overseas war.
	Tense	They are/were both steadfast individuals. .		
	Spillover	Their community should be very proud.		
21	Lifetime	George, a kindergartener, is sick from drinking polluted water from the local river. Ruth, who is in the same kindergarten, is doing fine as she only drinks milk.	George, a kindergartener, died of drinking polluted water from the local river. Ruth, who was in the same kindergarten, also died after having poisoned milk.	George, a kindergartener, died of drinking polluted water from the local river. Ruth, who is in the same kindergarten, is doing fine as she only drinks milk.
	Tense	They are/were both innocent children.		
	Spillover	No one knows where the pollutants came from.		
22	Lifetime	Mary has always been terrified of the dark, and she never stays at home by herself. Strangely, her boyfriend Alfred was attacked when he was alone, so he lives in a different flat now.	Mary was always terrified of clowns, and she died of fright one night when a clown jumped out of her closet. Strangely, her boyfriend Alfred was murdered when he was alone in his apartment.	Mary has always been terrified of the dark, and she never stays at home by herself. Strangely, her boyfriend Alfred was murdered when he was alone in his apartment.
	Tense	They both have/had anxious personalities.		
	Spillover	Sometimes, bad luck befalls good people.		

23	Lifetime	Bill was stabbed while biking home, and he still has not fully recovered from the injury. His roommate, David, is astonished and feels very unsafe about going out biking by himself.	Bill was stabbed while biking home, and his body was not found until the next morning. His roommate, David, went out looking for him, and was also stabbed to death.	Bill was stabbed while biking home, and his body was not found until the next morning. His roommate, David, is astonished and feels very unsafe about going out biking by himself.
	Tense	They are/were both experienced bicyclers.		
	Spillover	The perpetrator is still at large.		
24	Lifetime	Eva has been in an unhappy marriage for as long as she can remember. Her neighbor, Sylvia, suffered years of domestic violence, but she is now remarried.	Eva was in an unhappy marriage for the final twenty years of her life. Her neighbor, Sylvia, suffered years of domestic violence before taking her last breath.	Eva has been in an unhappy marriage for as long as she can remember. Her neighbor, Sylvia, suffered years of domestic violence before taking her last breath.
	Tense	They are/were both poor unfortunate souls.		
	Spillover	A woman's group has been established to help women like these.		
25	Lifetime	Vladimir lives in Chernobyl and is worried that nuclear radiation is getting more severe day by day. His cousin, Sergei, has become a U.S. citizen and is studying medical sciences.	Vladimir lived in Chernobyl before radiation sickness eventually took his life. His cousin, Sergei, was a U.S. citizen and devoted himself to medical research until his last breath.	Vladimir lived in Chernobyl before radiation sickness eventually took his life. His cousin, Sergei, has become a U.S. citizen and is studying medical sciences.
	Tense	They are/were both highly intelligent.		
	Spillover	More people like them should go into science.		
26	Lifetime	This textbook belongs to Sam, who is a PhD student in anthropology. His fiancée, Alice, is in danger of snakebite since she does fieldwork in the jungle.	This textbook belonged to Sam, who was an accomplished anthropologist when he was alive. His fiancée, Alice, was gunned down in a terrorist attack when she was travelling.	This textbook belongs to Sam, who is a PhD student in anthropology. His fiancée, Alice, was gunned down in a terrorist attack when she was travelling.
	Tense	They are/were both Rhodes scholars.		
	Spillover	Working with different cultures can be challenging and dangerous.		

27	Lifetime	Donald had alcohol poisoning, but he got sent to the hospital and is fine now. The bar owner, Roy, is quite upset about it, and worries about his business.	Donald got alcohol poisoning, and by the time he got to the hospital it was too late to save him. The bar owner, Roy, was murdered in a revenge.	Donald got alcohol poisoning, and by the time he got to the hospital it was too late to save him. The bar owner, Roy, is quite upset about it, and worries about his business.
	Tense	They are/were both heavy drinkers.		
	Spillover	Some in the neighborhood are boycotting the establishment.		
28	Lifetime	Kim is no longer bothered by her lung condition, as she has been fully cured. ,Her friend, Vivian, had a surgery and will be home soon.	Kim had been bothered by her lung condition and she was declared dead last Friday. Her friend, Vivian, died in a surgery and never made it home again.	Kim is no longer bothered by her lung condition, as she has been fully cured. Her friend, Vivian, died in a surgery and never made it home again.
	Tense	They both have/had a supportive family.		
	Spillover	Having support from family is important to everyone.		
29	Lifetime	Harold received death penalty for a murder he committed in the 1980s, and he now awaits execution. His sister, Hannah, is now the sole heir to their father's legacy.	Last week, Harold was executed by lethal injection because of the murder he committed in the 1980s. His sister, Hannah, was the sole heir to their father's legacy before she died in the '90s.	Last week, Harold was executed by lethal injection because of the murder he committed in the 1980s. His sister, Hannah, is now the sole heir to their father's legacy.
	Tense	They are/were both from a prestigious family.		
	Spillover	In such a family, things always get over-complicated.		
30	Lifetime	It has been three days since Alex ate something, and he now feels extremely hungry. His little brother, Daniel, can hardly bear the cold ,and must stay in a shelter.	It had been three weeks since Alex ate something, and in the end he starved to death. His little brother, Daniel, could not bear the cold and died overnight.	It has been three days since Alex ate something, and he now feels extremely hungry. His little brother, Daniel, could not bear the cold and died overnight.
	Tense	They are/were both penniless orphans.		
	Spillover	Such circumstances are especially difficult for young children.		

31	Lifetime	Jeremy, a cousin, is an architect and works for an international company. His wife, Aubrey, is now a senior engineer at the company and leads a team of 50 people.	Jeremy, a deceased cousin, was an architect and worked for an international company. His wife, Aubrey, was a senior engineer at the company before she passed away.	Jeremy, a deceased cousin, was an architect and worked for an international company. His wife, Aubrey, is now a senior engineer at the company and leads a team of 50 people.
	Tense	They both have/had strong managerial skills.		
	Spillover	Their companies will be looking to hire new talent.		
32	Lifetime	Phil was electrocuted in an accident at work, and he now has to stay at home with his three children. His wife Clare is now seeking legal advice to fight for compensation.	Phil was electrocuted in an accident at work, and the news of his death was covered by the company. His widow Clare had sought legal advice to fight for compensation, before she died of pneumonia.	Phil was electrocuted in an accident at work, and the news of his death was covered by the company. His widow Clare is now seeking legal advice to fight for compensation.
	Tense	They are/were both protective parents.		
	Spillover	It seems that their children will be well cared for.		
33	Lifetime	Vicky has to take care of her dog because he has been suffering a lot from arthritis. Her cat Lucy is still very healthy and shows no sign of aging or disease.	Vicky had to put her dog down because he had suffered a lot from arthritis. Her cat Lucy suddenly reached the end of his life before even showing any sign of aging.	Vicky had to put her dog down because he had suffered a lot from arthritis. Her cat Lucy is still very healthy and shows no sign of aging or disease.
	Tense	They are/were both great companions.		
	Spillover	This is why she always supports animal rights.		
34	Lifetime	Sophia is a very timid teenager, and she often gets mocked for being odd. She has never met her grandfather Chad, who has been living in another country for some time now.	Sophia was a very timid teenager, and she ended her life after getting mocked for being odd. She had never met her grandfather Chad, who has been six feet under for some time now.	Sophia is a very timid teenager, and she often gets mocked for being odd. She had never met her grandfather Chad, who has been six feet under for some time now.
	Tense	They both have/had sandy blonde hair.		
	Spillover	Their whole family has the same hair color.		

35	Lifetime	Julie's old house in the city was a little damaged in the earthquake, although it is still fine to live in. Her new house is in the suburbs where she now resides.	Julie's old house in the city was destroyed in the earthquake. Her new house was in the suburbs, but it too was taken out during the earthquake.	Julie's old house in the city was destroyed in the earthquake. Her new house is in the suburbs where she now resides.
	Tense	They are/were both small bungalows.		
	Spillover	Julie has always liked that style of house.		
36	Lifetime	Laura is a well-known writer but is often depressed and requires a lot of support. Her colleague Karen has chronic anxiety but tries to maintain a positive attitude.	Laura was a well-known writer but was often depressed and finally killed herself. Her colleague Karen had chronic anxiety and also took her own life.	Laura is a well-known writer but is often depressed and requires a lot of support. Her colleague Karen had chronic anxiety and also took her own life.
	Tense	They are/were both very clever authors.		
	Spillover	Mental health is such a common issue for society.		
37	Lifetime	These days, Owen often regrets not having done enough to end world hunger. His business partner, Hilary, is initiating a new project in honor of Owen to benefit the development of Africa.	In his remaining days, Owen regretted not having done enough in his life to end world hunger. His business partner, Hilary, left behind legacies that benefit the development of Africa before she died.	In his remaining days, Owen regretted not having done enough in his life to end world hunger. His business partner, Hilary, is initiating a new project in honor of Owen to benefit the development of Africa.
	Tense	They are/were both dedicated philanthropists.		
	Spillover	More people should donate to charity.		
38	Lifetime	Rob's brand new laptop is very light, and takes only seconds to start. His old laptop is quite shabby but it will still start up.	Rob's brand new laptop never started up, it had to be fully dismantled right after purchase. His old laptop broke down, and was disassembled by a professional.	Rob's brand new laptop is very light, and takes only seconds to start. His old laptop broke down, and was disassembled by a professional.
	Tense	They are/were both IBM products.		
	Spillover	That company makes very solid computing products.		

39	Lifetime	Michael is a refugee and he is trying to go to Australia by boat. Dana, who is also an asylum seeker, is much luckier and has settled down in Singapore safely.	Michael was a refugee and he starved to death while going to Australia by boat. Dana, who was also an asylum seeker, was killed in a typhoon on her way to Singapore.	Michael was a refugee and he starved to death while going to Australia by boat. Dana, who is also an asylum seeker, is much luckier and has settled down in Singapore safely.
	Tense	They are/were both from southeastern Asia.		
	Spillover	Many people like them lost their homes in regional conflicts.		
40	Lifetime	This museum is now open to the public, and has become a popular tourist attraction. The theatre right next to it is also quite lively and hosts hundreds of shows every week.	When this museum was still in one piece, it was a popular tourist attraction. The theatre right next to it collapsed years ago and never got to be repaired.	This museum is now open to the public, and has become a popular tourist attraction. The theatre right next to it collapsed years ago and never got to be repaired.
	Tense	They are/were both art deco designs.		
	Spillover	Every city should have access to the arts.		
41	Lifetime	When Stephen was climbing, he almost lost his old smartphone, but it is actually still with him. His other phone has even better interfaces and more apps.	When Stephen was climbing, he lost his old smartphone as it fell off a cliff. His other phone got waterlogged and died.	When Stephen was climbing, he lost his old smartphone as it fell off a cliff. His other phone has even better interfaces and more apps.
	Tense	They are/were both Apple products.		
	Spillover	These days, it is hard to live without a smartphone.		
42	Lifetime	The new lab is situated in the center of the university, and it is equipped with many computers. The old lab is now mainly used by undergraduate students.	The new lab was situated in the center of the university, but it was destroyed during an explosion. The old lab was set ablaze by a cigarette butt, and eventually burnt to the ground.	The new lab is situated in the center of the university, and it is equipped with many computers. The old lab was set ablaze by a cigarette butt, and eventually burnt to the ground.
	Tense	They are/were both physics laboratories.		
	Spillover	The university now has five other labs in total.		

43	Lifetime	After an unsuccessful negotiation, the original contract remained unsigned and needs a second round of negotiations. Another contract has been drafted, and is now ready to be signed off.	After an unsuccessful negotiation, the original contract was shredded by the furious manager. Another contract was drafted, but was also rejected.	After an unsuccessful negotiation, the original contract was shredded by the furious manager. Another contract has been drafted, and is now ready to be signed off.
	Tense	They are/were both business deals.		
	Spillover	To make a deal, one must be honest and fair.		
44	Lifetime	Fred's favourite birthday gift is a pottery mug that has many colourful patterns. Earlier this month, he accidentally broke his old mug, but it has now been repaired.	Fred's favourite birthday gift was a pottery mug, but it went missing after he used it only twice. Earlier this month, he accidentally broke his old mug, and it was unrepairable.	Fred's favourite birthday gift is a pottery mug that has many colourful patterns. Earlier this month, he accidentally broke his old mug, and it was unrepairable.
	Tense	They are/were both hand made.		
	Spillover	Fred usually drinks his coffee and tea in different mugs.		
45	Lifetime	A window in the basement was hit by a football, but it did not even crack. The spare window, which is kept just in case, is of higher quality.	Fred's favourite birthday gift was a pottery mug, but it went missing after he used it only twice. The spare window, which broke during installation, was of higher quality.	A window in the basement was smashed by a football, and it could not be fixed. The spare window, which is kept just in case, is of higher quality.
	Tense	They are/were both double paned.		
	Spillover	This way, the basement should be more insulated.		
46	Lifetime	Mary keeps her report card in a filing cabinet. She framed her graduation diploma which is hanging on the wall.	Mary cut her report card into pieces because of her low grades. Her graduation diploma burnt up in the house fire.	Mary keeps her report card in a filing cabinet. Her graduation diploma burnt up in the house fire.
	Tense	They are/were both from Mary's high school.		
	Spillover	Official documents like these should be protected.		

47	Lifetime	The law outlawing drug smuggling is very inhumane to alleged criminals, but it has been effective. A similar law, which outlaws drug sales, has recently been issued and is now in force.	The law outlawing drug smuggling was very inhumane to alleged criminals, and it was abolished in the end. A similar law, which outlawed drug sales, had recently been overturned and ceased to be in force.	The law outlawing drug smuggling was very inhumane to alleged criminals, and it was abolished in the end. A similar law, which outlaws drug sales, has recently been issued and is now in force.
	Tense	They are/were both acts of Congress.		
	Spillover	Drug use, however, continues to be a problem.		
48	Lifetime	Susanna's brother is playing with her new teddy bear. He also sometimes plays with her favorite doll when she lets him.	Susanna's brother ripped out all the stuffing of her old teddy bear. He also lost her favorite doll at their old house.	Susanna's brother is playing with her new teddy bear. He also lost her favorite doll at their old house.
	Tense	They are/were both hand crafted.		
	Spillover	Perhaps Susanna's parents will get her more toys soon.		
49	Lifetime	The original train station has been closed for a year and it is still undergoing redecoration. The interim station that is currently in use has an even higher level of security.	The original train station was ruined by wartime bombardment from the air. The interim train station had even more security before it was decommissioned.	The original train station was ruined by wartime bombardment from the air. The interim station that is currently in use has an even higher level of security.
	Tense	They both have/had six emergency exits.		
	Spillover	During an emergency, one must act fast and exit immediately.		
50	Lifetime	Kevin's latest MacBook has many impressive features, and it comes with Retina display. His new iPhone is also state of the art, and he carries it with him all the time.	Kevin's MacBook had many impressive features, but it was soon replaced by a more advanced version. His old Razr flip phone was once well-received but was discontinued years ago.	Kevin's latest MacBook has many impressive features, and it comes with Retina display. His old Razr flip phone was once well-received but was discontinued years ago.
	Tense	They both have/had built-in cameras.		
	Spillover	He is thinking about taking a real photography course.		

51	Lifetime	The rose from Susan's boyfriend is lovely and gives out an inviting scent. The lily she is holding is still blooming, and its petals look very delicate.	The rose that Susan's boyfriend gave her was left outside and completely decomposed. The lily she held also faded and had to be thrown in the trash.	The rose that Susan's boyfriend gave her was left outside and completely decomposed. The lily she is holding is still blooming, and its petals look very delicate.
	Tense	They are/were both quite aromatic.		
	Spillover	Having said that, some flowers can smell really horrible.		
52	Lifetime	Without having to wait, Lucy got her vanilla ice cream. She is also eyeing a chocolate fudge cake, which is quite thick and spongy.	While Lucy was away, her vanilla ice cream melted and had to be tossed out. She then ate a chocolate fudge cake, which was quite thick and spongy.	Without having to wait, Lucy got her vanilla ice cream. She then ate a chocolate fudge cake, which was quite thick and spongy.
	Tense	They are/were both very appetising.		
	Spillover	Eating desserts like these makes her happy.		
53	Lifetime	The green pill slipped through Mark's fingers and landed on the table. The red pill in his other hand is a highly restricted kind of medication.	The green pill slipped through Mark's fingers and was lost in the grass. The red pill in his other hand melted because he was sweating.	The green pill slipped through Mark's fingers and was lost in the grass. The red pill in his other hand is a highly restricted kind of medication.
	Tense	They are/were both insomnia medications.		
	Spillover	Thanks to the advancement of technology, Mark is feeling better.		
54	Lifetime	Since this is a birthday party, a 'happy birthday' banner is hanging on the wall. The balloons are also hanging on the ceiling to make everything look even nicer.	After the party was over, the 'happy birthday' banner was thrown into the trash. Unfortunately, the balloons popped when they were being taken down.	Since this is a birthday party, a 'happy birthday' banner is hanging on the wall. Unfortunately, the balloons popped when they were being taken down.
	Tense	They both have/had beautiful patterns.		
	Spillover	I think that Sarah had a really good time.		

55	Lifetime	News came that a ship encountered a violent storm on its return but will be arriving back shortly. Surprisingly, John's motorboat is still safe and sound, and there is no detectable damage.	News came that a ship encountered a violent storm on its return and finally sank. Unsurprisingly, John's motorboat was also wrecked, and the damage was beyond repair.	News came that a ship encountered a violent storm on its return and finally sank. Surprisingly, John's motorboat is still safe and sound, and there is no detectable damage.
	Tense	They both have/had a wooden helm.		
	Spillover	The ocean is lovely, but sailing can come with great risks.		
56	Lifetime	Julia's recently purchased Volvo is easy to drive and is quite fuel-efficient. She used to commute in her old Ford van, which still functions well but looks quite out of date.	Julia's recently purchased Volvo was easy to drive, but she totaled it last week. She used to commute in her old Ford van, but it was car jacked a few months ago.	Julia's recently purchased Volvo is easy to drive and is quite fuel-efficient. She used to commute in her old Ford van, but it was car jacked a few months ago.
	Tense	They both have/had a spare tire.		
	Spillover	Julia is not particularly into very luxurious cars.		
57	Lifetime	Yesterday on my uncle's farm, we saw a sheep. We also saw a cow, which is going to be sold next week.	Yesterday on my uncle's farm, we butchered a sheep. We also butchered a cow, and took the meat to market.	Yesterday on my uncle's farm, we butchered a sheep. We also saw a cow, which is going to be sold next week.
	Tense	They are/were both grain fed livestock.		
	Spillover	I think that my uncle has a neat job.		
58	Lifetime	Right now, the only thing written on the board is the answer to the physics exam. The answer to the chemistry exam is on the other side of the board.	Yesterday, the only thing written on the board was the answer to the physics exam, which was erased later. The answer to the chemistry exam was wiped off, and no trace was left at all.	Right now, the only thing written on the board is the answer to the physics exam. The answer to the chemistry exam was wiped off, and no trace was left at all.
	Tense	They are/were both in poor handwriting.		
	Spillover	Poor handwriting like that makes it difficult to read.		

59	Lifetime	This historical site is very well preserved, and all remains are strictly protected. A modern apartment has been built up on a different spot, and it has a luxurious rooftop swimming pool.	This historical site was torn down, and all remains were removed to a scrapyard. A modern apartment was built up on the same spot, but it was wiped off the map after only a few years.	This historical site was torn down, and all remains were removed to a scrapyard. A modern apartment has been built up on a different spot, and it has a luxurious rooftop swimming pool.
	Tense	They both have/had marble interiors.		
	Spillover	Some architectural elements always provide a classical look.		
60	Lifetime	This bank has a new branch on 5th Avenue. It is quite small but fully furnished. The original branch on High Street is no longer fully staffed, but it is still open for self-service.	This bank had a new branch on 5th Avenue. It was fully furnished but was soon demolished by urban planners. The original branch on High Street was ruined by an explosion, and could no longer provide service.	This bank has a new branch on 5th Avenue. It is quite small but fully furnished. The original branch on High Street was ruined by an explosion, and could no longer provide service.
	Tense	They both have/had steel security doors.		
	Spillover	It never hurts to have extra security.		

Table B.1: Experimental materials in English

Appendix C

Stimuli in Chinese

Item	Info	Living-Living	Dead-Dead	Conjoin
1	Lifetime	这栋房子属于张军，他在本地一间房地产公司上班。隔壁这栋房子属于他哥哥李强，他目前仍在欧洲生活。	这栋房子属于张军，他去年去世了。隔壁这栋房子属于他哥哥李强，他终其一生都在欧洲生活。	这栋房子属于张军，他去年去世了。隔壁这栋房子属于他哥哥李强，他目前仍在欧洲生活。
	Tense	他们都(曾)是英俊的男人。		
	Spillover	他们的亲戚会在下个月举行家庭聚会。		
2	Lifetime	我那三个月大的表妹甜甜，每次睡醒总是哭着找妈妈。可怜的是，她妈妈分娩时难产，至今身子也没完全恢复。	我早夭的表妹甜甜从前生病时总是哭着找妈妈。可怜的是，她妈妈难产死了，从未能抱一抱自己的女儿。	我那三个月大的表妹甜甜，每次睡醒总是哭着找妈妈。可怜的是，她妈妈难产死了，从未能抱一抱自己的女儿。
	Tense	她们都(曾)有一双又黑又亮的眼眸。		
	Spillover	孩子的父亲仍不知道该如何是好。		
3	Lifetime	李四是一名出色的电影导演，他在一场车祸中幸存了下来。他的妻子是一名获奖无数的女演员，听到这个消息后十分震惊。	李四曾是一名出色的电影导演，但他在一场车祸中不幸身亡。他的妻子曾是一名获奖无数的女演员，也不幸在此次车祸中遇难。	李四曾是一名出色的电影导演，但他在一场车祸中不幸身亡。他的妻子是一名获奖无数的女演员，听到这个消息后十分震惊。
	Tense	他们都(曾)是电影界重量级人物。		
	Spillover	他们的经纪人即将召开新闻发布会。		
4	Lifetime	昨天在学校时，吴欣看上去十分郁闷，不停地在流泪。她终于离开了虐待她多年的丈夫。	昨天在学校时，吴欣看上去十分郁闷，结果昨晚她自杀了。她的丈夫不久前刚因肺癌去世。	昨天在学校时，吴欣看上去十分郁闷，不停地在流泪。她的丈夫不久前刚因肺癌去世。
	Tense	他们都(曾)是高中教师。		

	Spillover	整个学校都被这个消息震惊了。		
5	Lifetime	这栋办公楼在上次的海啸中受到一点损坏，但仍在正常运作。而旁边那栋新装修的楼则一切完好。	这栋办公楼在上次的海啸中被完全摧毁。而旁边那栋新装修的楼也被毁得一塌糊涂。	这栋办公楼在上次的海啸中被完全摧毁。而旁边那栋新装修的楼则一切完好。
	Tense	它们都(曾)有二十层楼高。		
	Spillover	城市规划局仍然在审查那片地区的情况。		
6	Lifetime	王萍是个十分幸运的姑娘，在无数次意外中幸存了下来，探险经历丰富。赵松没什么好运气，第一次远足就被闪电击中，受了轻伤。	王萍曾是个十分幸运的姑娘，在无数次意外中幸存了下来，却没能躲过最后那一场灾难。赵松没什么好运气，第一次远足就被闪电击中，当场一命呜呼。	王萍曾是个十分幸运的姑娘，在无数次意外中幸存了下来，探险经历丰富。赵松没什么好运气，第一次远足就被闪电击中，当场一命呜呼。
	Tense	他们都(曾)是有冒险精神的人。		
	Spillover	他们的一位好友在一间酒吧里说起了他们的故事。		
7	Lifetime	张建，一名伏法的谋杀犯，已被判处死刑。他的犯罪同伙彭康还在畏罪潜逃，每天生活在痛苦之中。	张建，一名伏法的谋杀犯，已被执行死刑。他的犯罪同伙彭康还在畏罪潜逃，直到他坠崖丧命的消息传来。	张建，一名伏法的谋杀犯，已被执行死刑。他的犯罪同伙彭康还在畏罪潜逃，每天生活在痛苦之中。
	Tense	他们都(曾)是臭名昭著的重刑犯。		
	Spillover	当地警方对他们的案子依然很感兴趣。		
8	Lifetime	陈聪是一名篮球教练，他在本地一间高中任教。他的儿子陈泽今年年初在一场校园枪击案中幸存了下来，现在已经返回学校。	陈聪曾是一名篮球教练，他生前在本地一间高中任教。他的儿子陈泽今年年初在一场校园枪击案中不幸遇难。	陈聪是一名篮球教练，他在本地一间高中任教。他的儿子陈泽今年年初在一场校园枪击案中不幸遇难。
	Tense	他们都(曾)是NBA的球迷。		
	Spillover	这个镇子非常的小，人人都知道这些事情。		
9	Lifetime	小霞从小就喜欢在游泳池戏水，大学毕业后她去了澳洲工作。她的父亲每次去游泳时，都会想起女儿甜美的笑容。	小霞在游泳池被淹死的那一年，她只有二十岁。她那如今已仙逝的父亲曾是一名游泳教练，至死也没能从失去女儿的伤痛中恢复。	小霞在游泳池被淹死的那一年，她只有二十岁。她的父亲每次去游泳时，都会想起女儿甜美的笑容。
	Tense	他们都(曾)是游泳健将。		
	Spillover	游泳这项运动一直都是这家人的特长。		

10	Lifetime	秦峰刚从德国开完一个学术会议回来。他的同事刘婷在回家路上的一场车祸中受了轻伤。	秦峰从德国回来的途中遭遇了空难。他的同事刘婷在回家路上惨死于一场车祸。	秦峰刚从德国开完一个学术会议回来。他的同事刘婷在回家路上惨死于一场车祸。
	Tense	他们都(曾)是法医科学家。		
	Spillover	他们的同事都非常担心以后出行的安全。		
11	Lifetime	七年前，老林在抢险救灾工作中时，从火场惊险逃生。他的独生子小林，跟随着父亲的脚步，在火灾中救出过许多人。	七年前，老林在抢险救灾工作中时，葬身火场。他的独生子小林，跟随着父亲的脚步，最终也没能逃过一场大火。	七年前，老林在抢险救灾工作中时，葬身火场。他的独生子小林，跟随着父亲的脚步，在火灾中救出过许多人。
	Tense	他们都(曾)是舍己为人的消防队员。		
	Spillover	消防员是一项很危险的职业。		
12	Lifetime	曲先生是一个意志坚强的人，至今化解了许多场经济危机。而谭先生，则在公司破产后曾试图结短见，但被救了下来。	曲先生曾是一个意志坚强的人，生前化解了许多场经济危机。而谭先生，则在公司破产后寻了短见。	曲先生是一个意志坚强的人，至今化解了许多场经济危机。而谭先生，则在公司破产后寻了短见。
	Tense	他们都(曾)是金融界巨头。		
	Spillover	这些人对全球经济有着重大影响。		
13	Lifetime	那只小狗被主人给的坚果噎着了，但它很快就把东西给咳了出来。所幸的是，这家人的猫咪总是把别人喂给它的东西都吐出来。	那只小狗被主人给的坚果噎死了。倒霉的是，这家人的猫咪也被坚果给噎着了，最终也没能吐出来。	那只小狗被主人给的坚果噎死了。所幸的是，这家人的猫咪总是把别人喂给它的东西都吐出来。
	Tense	它们都(曾)是很娇小的宠物。		
	Spillover	这位主人当时真的应该更加小心一些。		
14	Lifetime	李铭特别擅长极限运动，总是敢于跨越崎岖山川。他的挚友曹劲在野外冒险时，被一条剧毒的蛇咬了一口，好在他已经痊愈。	李铭生前特别擅长极限运动，曾经多次跨越崎岖山川。他的挚友曹劲在野外冒险时，被一条剧毒的蛇咬了一口，匆匆告别了人世。	李铭特别擅长极限运动，总是敢于跨越崎岖山川。他的挚友曹劲在野外冒险时，被一条剧毒的蛇咬了一口，匆匆告别了人世。
	Tense	他们都(曾)是勇气非凡的旅行者。		
	Spillover	登山似乎是一项有风险的运动。		

15	Lifetime	在那家诊所上班的小翠，在一次医疗事故中使用药物过量，一度情况危急。她的同事小美对此事感到既震惊又难过。	之前在那家诊所上班的小翠，在一次医疗事故中死于药物过量。她的同事小美最初表现得很震惊，但后来被揭发是此事的真凶，最终以命偿命。	之前在那家诊所上班的小翠，在一次医疗事故中死于药物过量。她的同事小美对此事感到既震惊又难过。
	Tense	她们都(曾)是优秀的医务人员。		
	Spillover	诊所的其他人至今无法相信发生了什么。		
16	Lifetime	璐璐的奶奶常常给她打电话，因为她一个人在家十分孤单。去年，她的爷爷心脏病发作，如今还是需要家人的照看。	璐璐的奶奶在去世前曾常常给她打电话。去年，她的爷爷心脏病发作，不久便撒手人寰。	璐璐的奶奶常常给她打电话，因为她一个人在家十分孤单。去年，她的爷爷心脏病发作，不久便撒手人寰。
	Tense	他们都(曾)是慈祥的祖父母。		
	Spillover	璐璐把他们在战争中的遭遇写成了一部小说。		
17	Lifetime	小曼意外遭遇了一场雪崩，但所幸被一支专业救生队伍平安送了回来。她的未婚夫小坤心痛欲绝，至今无法继续他的绘画事业。	小曼意外遭遇了一场雪崩，尸骨至今未被找到。她的未婚夫小坤心痛欲绝，几周后便投河殉情了。	小曼意外遭遇了一场雪崩，尸骨至今未被找到。她的未婚夫小坤心痛欲绝，至今无法继续他的绘画事业。
	Tense	他们都(曾)是才华横溢的艺术家。		
	Spillover	他们的画仍然能卖出很高的价钱。		
18	Lifetime	白婷由于长期加班，积劳成疾，仍在与病魔作斗争。她的上司顾宁最近连续加班了一个礼拜，结果在上周五晚上晕倒在公司，至今还躺在医院。	白婷生前长期加班，积劳成疾，最终没能战胜病魔。她的上司顾宁最近连续加班了一个礼拜，结果在上周五晚上不幸猝死。	白婷由于长期加班，积劳成疾，仍在与病魔作斗争。她的上司顾宁最近连续加班了一个礼拜，结果在上周五晚上不幸猝死。
	Tense	她们都(曾)是极其勤奋的员工。		
	Spillover	律师们正代表她们的家人对公司展开调查。		
19	Lifetime	小欢最近被诊断出白血病，医生说她最多还能活两年。她的双胞胎哥哥小明如今年过三十，还时常运动以保持健康。	小欢在十岁那年被诊断出白血病，之后只多活了两年。她的双胞胎哥哥小明，也在三十岁那年早早离开了人世。	小欢在十岁那年被诊断出白血病，之后只多活了两年。她的双胞胎哥哥小明如今年过三十，还时常运动以保持健康。
	Tense	他们都(曾)是属羊的人。		
	Spillover	他们的弟弟也是在羊年出生的。		

20	Lifetime	在经历了这么多风雨之后，饶阿姨仍然十分坚强地生活着。她的儿子小余，仍在海外战场上为国家效力。	在经历了这么多风雨之后，饶阿姨终于能够在地下安息了。她的儿子小余，在一次海外战争中不幸战死沙场。	在经历了这么多风雨之后，饶阿姨仍然十分坚强地生活着。她的儿子小余，在一次海外战争中不幸战死沙场。
	Tense	他们都(曾)是意志十分坚强的人。		
	Spillover	他们的家人应当为此感到骄傲。		
21	Lifetime	在这家幼儿园就读的冬冬，在饮用当地的污染水之后，生了一场大病。她的同班同学妞妞，当时没有喝一口水，所以幸免于难。	曾在这家幼儿园就读的冬冬，在饮用当地的污染水之后，不幸中毒身亡。她的同班同学妞妞，在食用了大量毒奶粉之后，没能逃离死神的魔爪。	曾在这家幼儿园就读的冬冬，在饮用当地的污染水之后，不幸中毒身亡。她的同班同学妞妞，当时没有喝一口水，所以幸免于难。
	Tense	她们都(曾)是天真而无辜的孩子。		
	Spillover	谁也不知道这次的污染从何而来。		
22	Lifetime	小丽一直特别怕黑，所以她从不一个人待在家。她的男友小峰独自一人在家的那天，竟然遭人袭击，于是他便搬去了另一家公寓。	小丽生前特别怕黑，那晚的恶作剧害得她哮喘突发，竟然把她给活活吓死了。她的男友小峰独自一人在家的那天，竟然惨遭人谋杀。	小丽一直特别怕黑，所以她从不一个人待在家。她的男友小峰独自一人在家的那天，竟然惨遭人谋杀。
	Tense	他们都(曾)是非常胆小的人。		
	Spillover	有的时候，厄运反而会降临在好人头上。		
23	Lifetime	王凌在骑车回家的路上被人捅了一刀，他的伤口至今还没愈合。他的室友李凌被此事深受刺激，后来再也不敢一个人骑车上路了。	王凌在骑车回家的路上被人捅了一刀，他的尸体第二天清晨才被发现。他的室友李凌半夜出去找他，结果也被人用刀捅死了。	王凌在骑车回家的路上被人捅了一刀，他的尸体第二天清晨才被发现。他的室友李凌被此事深受刺激，后来再也不敢一个人骑车上路了。
	Tense	他们都(曾)是经验丰富的单车手。		
	Spillover	犯罪嫌疑人至今没有落入法网。		
24	Lifetime	兰阿姨多年以来一直都处在一段痛苦的婚姻中。她的邻居管阿姨曾遭受多年的家庭暴力，但如今另嫁贤人。	兰阿姨在人生最后的二十年里，都处在一段痛苦的婚姻中。她的邻居管阿姨无法忍受多年的家庭暴力，在服用安眠药后咽下了最后一口气。	兰阿姨多年以来一直都处在一段痛苦的婚姻中。她的邻居管阿姨无法忍受多年的家庭暴力，在服用安眠药后咽下了最后一口气。
	Tense	她们都(曾)是非常不幸的人。		
	Spillover	妇女保护协会应声而起，旨在保护女性权益。		

25	Lifetime	弗拉基米尔在切尔诺贝利工作了大半辈子，如今他十分担心日渐严重的核辐射污染。他的表弟伊万诺维奇最近移居美国，目前正在攻读医学研究领域的学位。	弗拉基米尔在切尔诺贝利工作了大半辈子后，最终被核辐射夺走了生命。他的表弟伊万诺维奇移居美国后，把自己的一生都奉献给了医学研究。	弗拉基米尔在切尔诺贝利工作了大半辈子后，最终被核辐射夺走了生命。他的表弟伊万诺维奇最近移居美国，目前正在攻读医学研究领域的学位。
	Tense	他们都(曾)是智力超群的人。		
	Spillover	应该有更多这样的人投身科学界。		
26	Lifetime	这本教科书是小丁的，他正在攻读人类学的博士学位。他的未婚妻小静常年在热带雨林中进行实地考察，不时有被毒虫咬伤的危险。	这本教科书曾属于小丁，他生前是一位赫赫有名的人类学家。他的未婚妻小静在一次旅行中，不幸遭遇恐怖袭击，当场死亡。	这本教科书是小丁的，他正在攻读人类学的博士学位。他的未婚妻小静在一次旅行中，不幸遭遇恐怖袭击，当场死亡。
	Tense	他们都(曾)是很有潜力的学者。		
	Spillover	跨文化的学术研究有很高的风险。		
27	Lifetime	何聪上个月遭遇酒精中毒，所幸送到医院后被抢救了过来，如今已恢复了七八成。那家酒吧的老板胡先生心情十分沉重，同时又担心自己的生意因此受到影响。	何聪上个月遭遇酒精中毒，被送到医院时已经来不及抢救了。那家酒吧的老板胡先生，不久后遭人报复，被砍死在家中。	何聪上个月遭遇酒精中毒，被送到医院时已经来不及抢救了。那家酒吧的老板胡先生心情十分沉重，同时又担心自己的生意因此受到影响。
	Tense	他们都(曾)是嗜酒如命的人。		
	Spillover	附近的邻居们纷纷考虑搬离这不祥之地。		
28	Lifetime	小芸终于不用再受肺病的折磨，因为她已经痊愈了。她的好友小芳在一家顶级医院就诊，手术成功后也很快出院了。	小芸因肺病受了多年折磨，上周五在医院安详辞世了。她的好友小芳曾在一家顶级医院就诊，结果却再也没能从手术台下来。	小芸终于不用再受肺病的折磨，因为她已经痊愈了。她的好友小芳曾在一家顶级医院就诊，结果却再也没能从手术台下来。
	Tense	她们都(曾)有一个充满爱的家庭。		
	Spillover	拥有来自家庭的支持对每个人都很重要。		
29	Lifetime	上个礼拜，王朗因故意杀人罪被判处死刑，缓期一年执行。他的姐姐王冉如今成了他们父亲遗产的唯一继承人。	上个礼拜，王朗因故意杀人罪被处决了。他的姐姐王冉成了他们父亲遗产的唯一继承人，结果她因太过激动而一夜暴毙。	上个礼拜，王朗因故意杀人罪被处决了。他的姐姐王冉如今成了他们父亲遗产的唯一继承人。
	Tense	他们都(曾)是家境显赫的人。		
	Spillover	这种家庭环境往往让事情变得很复杂。		

30	Lifetime	那个寒冬，小范连续三天没吃上一点儿东西，他现在饿得前胸贴后背。他的弟弟小壮难以忍受这刺骨的寒冷，只能待在一间收容所里。	那个寒冬，小范连续三周没吃上一点儿东西，最后他被活活饿死了。他的弟弟小壮忍受不住这刺骨的寒冷，在一个夜里归于尘土。	那个寒冬，小范连续三天没吃上一点儿东西，他现在饿得前胸贴后背。他的弟弟小壮忍受不住这刺骨的寒冷，在一个夜里归于尘土。
	Tense	他们都(曾)是身无分文的孤儿。		
	Spillover	这样的处境对于年幼的孩子而言尤为艰难。		
31	Lifetime	郭鹏是张校长的一位表亲，他作为一名建筑师在一家国际公司就职。他的妻子王莉，现担任高级工程师，管理着数十人的团队。	郭鹏是张校长一位已故的表亲，他生前作为一名建筑师在一家国际公司就职。他的妻子王莉，辞世前是一名高级工程师。	郭鹏是张校长一位已故的表亲，他生前作为一名建筑师在一家国际公司就职。他的妻子王莉，现担任高级工程师，管理着数十人的团队。
	Tense	他们都(曾)是不可多得的人才。		
	Spillover	他们的公司在各自招聘新员工。		
32	Lifetime	白峰在一次工作意外中遭到电击，如今他守在家中看护三个孩子。他的妻子小虹仍在试图通过法律手段寻求赔偿。	白峰在一次工作意外中遭到电击，结果一命归西，而他的公司偷偷瞒下了这则消息。他的妻子小虹曾试图通过法律手段寻求赔偿，但最终经不住肺炎的折磨，不久便香消玉殒。	白峰在一次工作意外中遭到电击，结果一命归西，而他的公司偷偷瞒下了这则消息。他的妻子小虹仍在试图通过法律手段寻求赔偿。
	Tense	他们都(曾)是心疼孩子的父母。		
	Spillover	他们的孩子应该会得到很好的照顾。		
33	Lifetime	薇薇必须照顾她的小狗，因为它年纪大了，身患数疾。她的小猫平日里还是一直活蹦乱跳的。	薇薇的小狗身患骨癌，痛苦不堪，最后不得不接受了安乐死。她的小猫平日里一直活蹦乱跳的，那天却突然断了气。	薇薇的小狗身患骨癌，痛苦不堪，最后不得不接受了安乐死。她的小猫平日里还是一直活蹦乱跳的。
	Tense	它们都(曾)是惹人怜爱的萌宠。		
	Spillover	这也就是为什么薇薇成为了一名动物权利保护者。		
34	Lifetime	小宁生性害羞，她在学校常常受到同学的嘲讽。她从未见过自己的祖父老宁，因为他多年前就移民去了南美洲。	小宁生性害羞，在经受不住同学的嘲讽后，竟然割腕轻生了。她从未见过自己的祖父老宁，因为他多年前就作古了。	小宁生性害羞，她在学校常常受到同学的嘲讽。她从未见过自己的祖父老宁，因为他多年前就作古了。
	Tense	他们都(曾)有一头自然卷发。		
	Spillover	他们全家人都有着相同的发质。		

35	Lifetime	灿灿家的老房子在上次地震中稍稍受了点影响，但是还能住人。她家的新房子建在郊区一带，是他们一家人目前的住处。	灿灿家的老房子在上次地震中被完全摧毁了。她家的新房子建在郊区一带，但也在地震被毁得一塌糊涂。	灿灿家的老房子在上次地震中被完全摧毁了。她家的新房子建在郊区一带，是他们一家人目前的住处。
	Tense	它们都(曾)都是双层复式别墅。		
	Spillover	灿灿一直非常喜欢这种风格的建筑。		
36	Lifetime	小冉是一名知名作家，然而她常年抑郁，需要家人朋友一直在身边扶持。她的好友小丹患有慢性忧郁症，但她一直保持积极心态，并且配合医生治疗。	小冉是一名知名作家，然而她常年抑郁，最终选择了自缢。她的好友小丹患有慢性忧郁症，年纪轻轻便命赴黄泉。	小冉是一名知名作家，然而她常年抑郁，需要家人朋友一直在身边扶持。她的好友小丹患有慢性忧郁症，年纪轻轻便命赴黄泉。
	Tense	她们都(曾)是很有天赋的作家。		
	Spillover	心理疾病已俨然成为社会一大危害。		
37	Lifetime	最近这段时间，老龚十分后悔自己之前没能为贫困地区多做贡献。他的生意伙伴老何正忙着展开一个新项目，致力于支持西部地区的发展。	临终前，老龚十分后悔自己没能为贫困地区多做贡献，不得不带着遗憾离世了。他的生意伙伴老何留下了大笔遗产，用于支持西部地区的发展。	临终前，老龚十分后悔自己没能为贫困地区多做贡献，不得不带着遗憾离世了。他的生意伙伴老何正忙着展开一个新项目，致力于支持西部地区的发展。
	Tense	他们都(曾)是充满爱心的慈善家。		
	Spillover	希望会有更多的人为基金会捐款。		
38	Lifetime	老罗的新电脑十分轻薄，而且只需要几秒钟就能开机。他的旧电脑虽然看上去破旧，但还能正常使用。	老罗的新电脑无法开机，才刚刚买来就被完全拆卸成了一个个零件。他的旧电脑彻底报废了，由一位专业人员完成了拆卸，以便废品回收。	老罗的新电脑十分轻薄，而且只需要几秒钟就能开机。他的旧电脑彻底报废了，由一位专业人员完成了拆卸，以便废品回收。
	Tense	它们都(曾)是联想的产品。		
	Spillover	这家公司发行的电子产品都很不错。		
39	Lifetime	姜志是一名政治难民，他正在试图逃离北韩。他的同伴林宇也在寻求他国庇护，最终在东南亚落脚。	姜志曾是一名政治难民，他在逃离北韩的过程中撒手人寰。他的同伴林宇也在寻求他国庇护的过程中惨遭迫害，气绝身亡。	姜志曾是一名政治难民，他在逃离北韩的过程中撒手人寰。他的同伴林宇也在寻求他国庇护，最终在东南亚落脚。
	Tense	他们都(曾)是来自社会底层的穷人。		
	Spillover	令人难过的是，有许多这样的人有家不能回。		

40	Lifetime	这件博物馆目前已对外开放，逐渐成为了本地的一处著名旅游景点。它旁边的那家戏院也生气勃勃，每周上演好几百台戏。	这件博物馆还存在的时候，曾是本地的一处著名旅游景点。它旁边的那家戏院多年前被拆除了，至今无人处理废墟。	这件博物馆目前已对外开放，逐渐成为了本地的一处著名旅游景点。它旁边的那家戏院多年前被拆除了，至今无人处理废墟。
	Tense	它们都(曾)有后现代的装饰风格。		
	Spillover	每一座城市都该有一些艺术气息。		
41	Lifetime	小潘去爬山时，以为旧手机被自己弄丢了，但其实还放在他身上好好的。他的另一只手机界面更加优化，并配有更多实用软件。	小潘去爬山时，旧手机从他手中滑落，在山间摔得连碎片都不见踪影。他的另一只手机进了水，也彻底报废了。	小潘去爬山时，旧手机从他手中滑落，在山间摔得连碎片都不见踪影。他的另一只手机界面更加优化，并配有更多实用软件。
	Tense	它们都(曾)是国产品牌手机。		
	Spillover	现如今，没有了手机简直寸步难行。		
42	Lifetime	这间新实验室坐落在大学的正中心，配备有最先进的科学器材。那间旧实验室现在主要是本科生在使用。	这间新实验室坐落在大学的正中心，可惜在一次爆炸中被彻底摧毁了。那间旧实验室被一只烟头点燃，引发了大火，最终被烧为平地。	这间新实验室坐落在大学的正中心，配备有最先进的科学器材。那间旧实验室被一只烟头点燃，引发了大火，最终被烧为平地。
	Tense	这它们都(曾)是物理实验室。		
	Spillover	目前，大学还设有另外五间实验室。		
43	Lifetime	在谈判失败后，原来这份合同没能被签下来，于是第二轮谈判拉开帷幕。最新的一份合同是由专人起草的，现在双方终于准备正式签字了。	在谈判失败后，原来这份合同被气愤的老总撕得粉碎。最新的一份合同是由专人起草的，但也被双方否决了，成了一张废纸。	在谈判失败后，原来这份合同被气愤的老总撕得粉碎。最新的一份合同是由专人起草的，现在双方终于准备正式签字了。
	Tense	它们都(曾)是价值上亿的大合同。		
	Spillover	想做好生意，必须要诚实和坦率才行。		
44	Lifetime	小晶今年最喜欢的生日礼物是一只陶瓷杯，那上面有各种漂亮的图案。这个月月初的时候，她一不小心把原来常用的那只杯子摔到了地上，所幸一点儿裂痕也没留下。	小晶今年最喜欢的生日礼物是一只陶瓷杯，但她只用过两次就弄丢了。这个月月初的时候，她一不小心把原来常用的那只杯子摔得粉碎。	小晶今年最喜欢的生日礼物是一只陶瓷杯，那上面有各种漂亮的图案。这个月月初的时候，她一不小心把原来常用的那只杯子摔得粉碎。
	Tense	它们都(曾)是珍贵的纪念品。		

	Spillover	小晶一般用不同的杯子喝咖啡和茶。		
45	Lifetime	储藏室的玻璃窗被一只足球撞到了，可是没有出现任何裂痕。家里还有一块备用的玻璃窗，应该质量更好。	储藏室的玻璃窗被一只足球撞得粉碎，再多胶水也补不回去了。家里那块备用的玻璃窗原本应该质量更好，结果在装修的过程中就碎了一地。	储藏室的玻璃窗被一只足球撞得粉碎，再多胶水也补不回去了。家里还有一块备用的玻璃窗，应该质量更好。
	Tense	它们都(曾)是双层的玻璃窗。		
	Spillover	这样一来，储藏室应该更加安全了。		
46	Lifetime	珍珍把自己的成绩单保存在了一个档案柜里。她把毕业证书裱了起来，并且挂在墙上。	珍珍看到自己拿了这么低的分数，气得把成绩单撕成了碎片。她的毕业证书在一场大火中被烧成了灰烬。	珍珍把自己的成绩单保存在了一个档案柜里。她的毕业证书在一场大火中被烧成了灰烬。
	Tense	它们都(曾)是珍珍高中颁发的文件。		
	Spillover	这一类的重要文件应该好好保护。		
47	Lifetime	那项严禁毒品走私的法律对于罪犯的惩罚措施相当不人道，但至今仍有法律效力。另一项内容相似的法令最近被提上了议程，今日起生效了。	那项严禁毒品走私的法律对于罪犯的惩罚措施相当不人道，最终被废除了。另一项内容相似的法令最近也被议会推翻，从上个月起便失效了。	那项严禁毒品走私的法律对于罪犯的惩罚措施相当不人道，最终被废除了。另一项内容相似的法令最近被提上了议程，今日起生效了。
	Tense	它们都(曾)是国家级的法律。		
	Spillover	然而，毒品走私案件不减反增。		
48	Lifetime	娜娜的弟弟正在玩她心爱的泰迪熊。他有时候也会玩一玩姐姐最喜欢的娃娃。	娜娜的弟弟把她心爱的泰迪熊扯得稀巴烂。他还把姐姐最喜欢的娃娃弄丢了，哪儿也找不着。	娜娜的弟弟正在玩她心爱的泰迪熊。他还把姐姐最喜欢的娃娃弄丢了，哪儿也找不着。
	Tense	它们都(曾)是手工精制的玩偶。		
	Spillover	或许娜娜的爸爸妈妈会买给她更多玩具。		
49	Lifetime	那间旧火车站停运了一年，不久前终于完成了装修。这间目前正在运营的临时火车站拥有更高的安全级别。	那间旧火车站在内战期间的一次空袭中被毁了。这间临时火车站安全级别更高，可不久后也报废了。	那间旧火车站在内战期间的一次空袭中被毁了。这间目前正在运营的临时火车站拥有更高的安全级别。
	Tense	它们都(曾)有六个紧急出口。		
	Spillover	紧急情况发生时，必须反应迅速，立刻离开现场。		

50	Lifetime	老倪的苹果电脑配备了许多强大的功能，而且拥有特别高清的显示屏。他的苹果手机也是最新款的。	老倪的苹果电脑配备了许多强大的功能，但它很快就被一个更先进的型号给取代了。他过去拥有的那只翻盖手机也曾很好用，但多年前就已无法维修了。	老倪的苹果电脑配备了许多强大的功能，而且拥有特别高清的显示屏。他过去拥有的那只翻盖手机也曾很好用，但多年前就已无法维修了。
	Tense	它们都(曾)有内置摄像头。		
	Spillover	老倪打算去上摄影课，发展他的业余爱好。		
51	Lifetime	小娟男朋友送给她的玫瑰看上去十分惹人怜爱，还散发着阵阵香气。她手里握着的百合花正要盛开，朵朵花瓣娇媚极了。	小娟男朋友送给她的玫瑰被扔在了外头，逐渐腐烂在泥土里。她手里握着的百合花也已凋零，不得不被丢弃到废纸篓里。	小娟男朋友送给她的玫瑰被扔在了外头，逐渐腐烂在泥土里。她手里握着的百合花正要盛开，朵朵花瓣娇媚极了。
	Tense	它们都(曾)是香气迷人的鲜花。		
	Spillover	尽管如此，有些花儿闻起来真叫一个臭气熏天。		
52	Lifetime	还没等多久，莉莉就拿到了她手上这只冰淇淋。现在她又盯上了一块看上去又甜又软的巧克力蛋糕。	莉莉刚走开一小会儿，她的冰淇淋就化了一地，只能被收拾进垃圾桶里。后来她吃了一块又甜又软的巧克力蛋糕。	莉莉刚走开一小会儿，她的冰淇淋就化了一地，只能被收拾进垃圾桶里。现在她又盯上了一块看上去又甜又软的巧克力蛋糕。
	Tense	它们都(曾)是令人垂涎的甜点。		
	Spillover	吃甜食总是让她特别开心。		
53	Lifetime	那片绿色的小药片从阿伟指缝中逃脱，掉到了桌子上。他另一只手中紧握的红色小药丸是违禁物品。	那片绿色的小药片从阿伟指缝中逃脱，掉进水里完全溶解了。他紧张的手心出汗，另一只手中紧握的红色小药丸也迅速融化了。	那片绿色的小药片从阿伟指缝中逃脱，掉进水里完全溶解了。他另一只手中紧握的红色小药丸是违禁物品。
	Tense	它们都(曾)是治疗失眠的良药。		
	Spillover	多亏了药物科技的发展，阿伟已经好多了。		
54	Lifetime	在这场生日派对上，一张写着“生日快乐”的横幅被高高挂在墙上。不仅如此，还有几只气球点缀着天花板，看上去十分喜庆。	派对结束后，写着“生日快乐”的那张横幅被扯了下来，送进了垃圾填埋站。倒霉的是，气球在被取下来的过程中全都炸了开来。	在这场生日派对上，一张写着“生日快乐”的横幅被高高挂在墙上。倒霉的是，气球在被取下来的过程中全都炸了开来。
	Tense	它们都(曾)有多彩的图案。		
	Spillover	派对上，大家都玩得十分尽兴。		

55	Lifetime	新闻上说，一艘客船在返程中遭遇了风暴，但很快就平安地抵达了目的地。幸运的是，钱老板的私人汽艇在此次风暴中毫发未损。	新闻上说，一艘客船在返程中遭遇了风暴，最终沉入了海里。钱老板的私人汽艇也在此次风暴受到了难以修补的损坏，最终报废了。	新闻上说，一艘客船在返程中遭遇了风暴，最终沉入了海里。幸运的是，钱老板的私人汽艇在此次风暴中毫发未损。
	Tense	它们都(曾)有一只木质的船舵。		
	Spillover	大海虽美，航海却充满了各种风险。		
56	Lifetime	叔叔新买的沃尔沃轿车酷炫时尚，而且特别节省能源。他那辆老车是台福特，虽然还能开，可是看上去挺旧的。	叔叔新买的沃尔沃轿车酷炫时尚，可惜才买来一个礼拜，它就被一个酒驾司机撞成一堆废铁。他之前的那辆老车是台福特，可是几个月前就送去废弃物处理中心了。	叔叔新买的沃尔沃轿车酷炫时尚，而且特别节省能源。他之前的那辆老车是台福特，可是几个月前就送去废弃物处理中心了。
	Tense	它们都(曾)有一只备用轮胎。		
	Spillover	叔叔对于豪华轿车并不十分感兴趣。		
57	Lifetime	昨天叔叔在农场里看见了一只羊。另外，他还看见了一头牛，但它下个礼拜就要被卖掉了。	昨天叔叔在农场里亲手宰杀了一只羊。另外，叔叔还宰了一头牛，并且把肉拿去了市场上卖。	昨天叔叔在农场里亲手宰杀了一只羊。另外，他还看见了一头牛，但它下个礼拜就要被卖掉了。
	Tense	它们都(曾)是纯有机饲养的。		
	Spillover	叔叔的农场生意做得红红火火。		
58	Lifetime	黑板的这一面现在只写着物理考试的答案。化学考试的答案在黑板的另一面。	黑板上本来写着物理考试的答案，但昨天下午就被人擦掉了。化学考试的答案被抹得干干净净，没留下一点痕迹。	黑板的这一面现在只写着物理考试的答案。化学考试的答案被抹得干干净净，没留下一点痕迹。
	Tense	它们都(曾)是字迹潦草的答案。		
	Spillover	这么潦草的字迹简直让人难以辨认。		
59	Lifetime	这片历史古迹得到了很好的保护，所有遗留的部分都受到着严格的看管。一幢现代化的公寓在城市的另一端被建了起来，公寓顶楼还配有奢华的露天游泳池。	这片历史古迹被原地推倒了，所有遗留的部分也被送去了废品厂。一幢现代化的公寓在原址上被建了起来，但几年之后又被拆除了。	这片历史古迹被原地推倒了，所有遗留的部分也被送去了废品厂。一幢现代化的公寓在城市的另一端被建了起来，公寓顶楼还配有奢华的露天游泳池。
	Tense	它们都(曾)有大理石地板。		
	Spillover	这种材质的地板总是看起来特别古典高贵。		

60	Lifetime	这家银行在霞飞路上开了家新分行，里里外外装饰一新。它在凤起路上的老分行虽然还开门，但没有配备任何职员。	这家银行原本在霞飞路上开了家新分行，可是没多久就被政府勒令拆除了。它在凤起路上的老分行则毁于一次爆炸中。	这家银行在霞飞路上开了家新分行，里里外外装饰一新。它在凤起路上的老分行则毁于一次爆炸中。
	Tense	它们都(曾)有一扇钢化防盗门。		
	Spillover	多配备一些安全防范措施总是不会错的。		

Table C.1: Experimental materials in Chinese

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