ASPECTUAL INFLUENCE ON TEMPORAL RELATIONS: A CASE STUDY OF THE EXPERIENTIAL GUO IN MANDARIN

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ABSTRACT
This paper examines how the temporal relation between a clause containing the experiential guo and an adjacent clause is determined. Mandarin is a language not morphologically marked for tenses (e.g., Lin 2006), and therefore, tenses cannot help in determining temporal relations in Mandarin. However, Mandarin has a rich aspectual system. This paper argues that the experiential guo indirectly influences temporal relations via rhetorical relations by either specifying a default rhetorical relation, or by constraining the circumstances under which a certain rhetorical relation can connect a clause with guo to an adjacent clause. This paper also argues that the default rhetorical relation and the constraints are determined by the aspectual properties of the experiential marker. Other information, such as discourse connectors, lexical information, etc., can override the default rhetorical relation indicated by guo and specifies a rhetorical relation. Therefore, this paper concludes that in Mandarin aspect markers can indirectly affect temporal relations by means of rhetorical relations, a result consistent with Wu’s (2005b) paper on the perfective marker le in Mandarin, and Wu’s (2007b, 2004) work on the progressive marker zai and the durative marker zhe.

Key words: temporal relations, experiential guo, semantics-pragmatics interface
1. INTRODUCTION

The clauses in a discourse can be organized temporally. In languages, such as English, which are marked for tense, tense plays a role in determining the temporal relation between two sentences. For sentences marked with the same tense, for example, past tense, Asher and Lascarides (2003) propose that rhetorical relations determine temporal relations, among other things.

Though there is still discussion as to whether Mandarin has tenses (e.g., Lin 2003b vs. Lin 2006), at least it is a fact that Mandarin is not morphologically marked for tenses. Thus, explicit tense information such as the verbal inflections in English cannot help to determine temporal relations in Mandarin. However, Mandarin has a rich aspectual system (e.g., Li and Thompson 1981: 184-237). Chang (1998), Smith and Erbaugh (2001, 2005), Lin (2003a, 2006), etc., respectively, propose that situation types (lexical aspect or aktionsart) determine temporal reference in Mandarin. Along similar lines, it is reasonable to hypothesize that, in Mandarin, aspect markers can influence temporal relations. This paper examines how the experiential go, a perfective marker, affects temporal relations. It is argued that the experiential go, by default, specifies that a clause containing the experiential go serves as informational background, which indicates temporal precedence, and that the internal process of an eventuality presented by the experiential go cannot be accessed unless accessing the process is required. That is, following Asher and Lascarides’ (2003) proposal about the interaction between rhetorical relations and temporal relations, this paper argues that aspect markers in Mandarin affect temporal relations via rhetorical relations either by specifying a default rhetorical relation or by setting a constraint on rhetorical relations, consistent with Wu’s (2004, 2005b, 2007a, 2007b) research on aspect markers including the perfective le, the progressive zai, and the durative zhe, and on sentences with no aspect markers.

This paper is organized as follows. In Section 2, I briefly review the studies on the semantics of the experiential go, such as Yeh (1993, 1996) and Wu (2005a, 2008). Based on the semantics of go, I propose a hypothesis for the role of go in temporal relations. In Section 3, I test the hypothesis against examples retrieved from the five-million-word Academia Sinica Balanced Corpus (for short, the Sinica Corpus). In Section 4, I model the phenomena observed with Segmented Discourse
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Representation Theory (henceforth, SDRT). In Section 5, I conclude this paper.

2. SEMANTICS OF THE EXPERIENTIAL GUO

The experiential guo is a perfective marker. It is called ‘experiential’ because it indicates that the subject has had the experience of having done something or has experienced something at least once. But, as noted in Yeh (1993: 15), an experience expressed by the experiential guo is very different from the thematic role experiencer. An NP receiving an experiencer role must be sentient, but this is not a requirement of the experiential guo. In (1), the subject is not sentient, but it is still compatible with the experiential guo.

(1) zhe ge guojia fasheng guo neizhan
    this CL country happen Exp1 civil war
    ‘This country had a civil war before.’

The literature on the experiential guo, such as Chao (1968), Ilič (1990), Smith (1997), Yeh (1993, 1996), etc., proposes four important properties of guo. First, guo has a ‘class’ meaning. Secondly, guo involves discontinuity. Thirdly, guo goes only with recurrable eventualities, and fourthly an eventuality presented by guo is temporally independent of others in the same discourse.

Observing that guo behaves parallel to a universal quantifier in ‘temporal subordination’ (Karttunen 1976) in that a sentence independent of another one which is quantified over by a universal quantifier can access the discourse referents in the DRS of the sentence with the universal quantifier as long as the independent one contains a temporal quantifier, as in (2) and (3). Yeh proposes that guo is a quantifier, just like every, though guo quantifies over eventualities, while every quantifies over entities.

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1 The abbreviations used in this paper include: CL for classifiers, DE for the modifier-modifiee marker, DRS for Discourse Representation Structure, Exp for the experiential marker guo, Pfv for the perfective marker le, Prc for particles, TMP_LOC for temporal location phrases and REL for the relative clause marker.
(2) a. Harvey courts a girl at every convention.
   b. She *(always) comes to the banquet with him.

(3) a. ta  qu  nar   diao   guo  yu
   he go there hook Exp fish
   ‘He went there to fish (before).’
 b. *(zongshi)  diao  dao  banye    cai  hui   jia
   always   hook  to midnight then return home
   ‘He *(always) fished until midnight and then went home.’

Yeh tries to explain the four properties of *guo* with the unified semantics she proposes. A quantifier needs to obey the Plurality Condition of Quantification (de Swart 1991) and this is why *guo* has a ‘class’ meaning. The ‘class’ is the plural set of entities quantified over. To be compatible with *guo*, an eventuality occurs more than once so that a set of multiple occurrences of the eventuality can be formed, i.e., the Recurrence condition. For the same eventuality to occur more than once, it has to be discontinued first. Because *guo* is a quantifier and creates a sub-DRS, the eventuality presented by *guo* is not accessible to eventualities outside the sub-DRS created by *guo*. This is where temporal independence comes from.

Wu (2005a, 2008) observes examples counter to the critical evidence for Yeh’s (1993, 1996) quantificational approach. Yeh’s account of *guo* is based on the observation that an eventuality presented by *guo* is inaccessible to another eventuality unless the latter is presented by a temporal quantifier, such as *zongshi* ‘always’. However, Wu finds examples from the Sinica Corpus where an eventuality presented by *guo* can be accessed by another eventuality that is not quantified over by any temporal quantifier, as in (4) and (5) below.

(4) a. liang nian qian  ta  hui   guo  hunan laojia
   two  year before he return Exp Hunan hometown
   ‘Two years before, he returned to his hometown in Hunan.’
 b. yijiuwuba nian di   zaidu  fan   xiang shi
   1958     year end  again  return home time
   ‘When he returned home again at the end of 1958, …’
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c. faxian renshiyifei
   find everything change
   ‘(he) found that everything had changed.’

(5) a. wo  zhi  ting  guo  qian xiaozhang gei huaxue
   I   only hear   Exp  Qian president   for chemistry
   xi    tongxuemen zuo   de   youguan
   department classmates   make REL about
   fenxi  huaxue   de   yanshuo
   analytic chemistry DE speech
   ‘I only heard the speech on analytic chemistry that
   President Qian delivered to the chemistry majors once.’

b. ta  yuzhongxinchangde  mianli     tongxue   yi  fan hua
   he sincerely         encourage   classmate one CL words
   ‘He sincerely encouraged the students he addressed.’

c. zhi  jin   hai  jiyiyouxin
   to   now still memory-fresh
   ‘The memory of it is still fresh till now.

In (4), (4b) advances the narrative time of (4a), but (4b) does not
contain any temporal quantifier. In (5), (5b) is temporally included in
(5a), and again (5b) does not contain a temporal quantifier. The two
examples show that accessing an eventuality presented by guo does not
require a temporal quantifier, and therefore guo does not behave parallel
to universal quantifiers, such as every. That is, we can conclude that the
experiential guo cannot be a quantifier.

Arguing against Yeh’s quantificational account, Wu (2008) proposes
that the experiential guo in Mandarin predicates on situations whose
semantics as a whole is terminable. Situations in the world can be
categorized into one of two groups in terms of the number of the
components in the semantics: The first group denotes bipartite semantics,
i.e., a bounded event plus a (resultative) state or an activity plus a

2 A reviewer asks if it is possible that there is an implicit/covert modal in (4c) and (5b)
interpreted like ‘just as usual’ so that the quantifier-account of the experiential guo can
still work. In the Sinica Corpus, the paragraph containing (4) is about the situations in
Hunan before and after the Cultural Revolution in China. The passage presented as (4) in
this paper actually provides a contrast between the situation of Hunan before the Cultural
Revolution and that after the Cultural Revolution. Therefore, it is not likely that there is
an implicit modal meaning ‘just as usual’ here.
(resultative) state, and the second group unary semantics, which can be either an activity or a state. Terminability means completion in the case of a bounded situation and termination in that of an unbound situation. To be compatible with experiential guo, both parts in bipartite semantics and the only part in unary semantics must be terminable.

Because terminability is the required condition for compatibility with experiential guo, Wu argues that, among the properties that guo is usually claimed to have in the literature, only discontinuity is an inherent property of guo. As for properties such as a class meaning and the condition of recurrence, Wu first shows that an eventuality guo presents does not necessarily have a class meaning. Then he argues that these two properties are just one facet of terminability and that they both follow naturally from terminability. Furthermore, he establishes that temporal independence and indefinite past are defeasible inferences from terminability. He also argues that the difference between the perfective le and the experiential guo lies in that the perfective le accesses only the left side of the semantics of a situation le presents, while the experiential guo accesses the whole semantics of a situation guo presents. This difference explains why the perfective le and the experiential guo are interchangeable in some contexts, but not in the others. Moreover, a terminated situation tends to occur in the remote unknown past.

Based on the proposal that the experiential guo presents a situation whose semantics as a whole is terminable and that a situation presented by guo was realized in the unknown past, the experiential guo is hypothesized to have two effects on temporal relations:

(6) Hypothesis for the role of the experiential guo in temporal relations:
   a. The event time of a situation presented by guo cannot be advanced unless the time is explicitly specified.
   b. The internal process of a situation presented by guo cannot be accessed unless it is forced open so as to render it accessible.

3. TESTING THE HYPOTHESIS

The experiential guo presents an eventuality that occurs in the unknown past, i.e., the event time is unknown. Since the event time is unknown, it cannot be advanced. However, if the event time of an eventuality that guo presents is specified, then the event time can be
advanced. In SDRT terms, when the event time of an event is advanced, the sentence described by the event is connected to the sentence following it by *Narration*. Hypothesis (a) is borne out by the example below.

(7) a. *(liang nian qian) ta hui guo hunan laojia*
   ‘Two years before (1958), he returned to his hometown in Hunan.’

b. *yijiuwuba nian di zaidu fan xiang shi*
   ‘When he returned home again at the end of 1958,…’

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3 Given this example, one might try to associate *guo* with the past perfect in English. However, *guo* does not equal the past perfect. For example,

(i) a. *ta *(zuotian) chi guo niupai*
   ‘He ate steak yesterday.’

b. *jintian you yao chi*
   ‘(He) will eat (steak) again today.’

c. *shizai tai you qian le*
   ‘(all of which is to say that he is) really too rich.’

*Guo* in (iia) is not past perfect because it does not describe an event that occurred before a past time. The important thing here is that a temporal adverbial is obligatory in this example and in (7).

4 A reviewer suggests that the experiential *guo* may not need explicit time to occur in a *Narration* context. S/he uses the following examples to support this possibility.

(i) a. *ta hui guo hunan laojia hen duo ci*
   ‘He returned to his hometown in Hunan many times.’

b. *yijiuwuba nian di zaidu fan xiang shi*
   ‘When he returned home at the end of 1958,’

c. *fanxian renshiyifei*
   ‘(He) found that everything had changed.’
c. faxian renshiyifei
   find   everything change
   ‘(he) found that everything had changed.’

In the example above, (7b) occurs after (7a). In Smith’s (2003) terms, (7b) advances the narrative time of (7a). In order to advance the narrative time, the event time of (7a) must be specified. This is why the temporal phrase liang nian qian ‘two years before’ is obligatory in (7a).

An eventuality that guo presents can temporally include another eventuality. Temporal inclusion for the experiential guo is possible only when another eventuality is a specific example of or provides more details on the eventuality that guo presents. See the example below.

(8) a. wo zhi ting guo qian xiaozhang gei huaxue
   I only hear Exp Qian president for chemistry
   xi tongxuemen zuo de youguan
   department classmates make REL about
   fenxi huaxue de yanshuo
   analytic chemistry DE speech
   ‘I only heard the speech on analytic chemistry that
   President Qian delivered to the chemistry majors once.’

(ii) a. ta chi guo niupai hen duo ci
   he eat Exp steak very many time
   ‘He has eaten steak many times.’
   b. jintian you yao chi
   today again is going to eat
   ‘Today, he is going to eat (steak) again.’
   c. shizai tai you qian le
   truly too have money Prc
   ‘He is truly rich.’

It is true that in these two examples the events described by the (b) sentences temporally follow the events described by the (a) sentences. However, this temporal relation does not mean that the (a) and (b) sentences are connected by *Narration*. A good test is to use cue phrases such as *zhihou* ‘after’. This cue phrase can be added between two sentences connected by *Narration*. Hence, it can be added to (7b) and the discourse remains coherent. However, this cue phrase cannot be added to (ib) and (iib). This suggests that (ia) and (ib) on the one hand, and (iia) and (iib) on the other are not examples of *Narration*. Therefore, these two examples are not counterexamples to Hypothesis (6).
His encouragement to the students he addressed, described in (8b), obviously is one of the topics talked about in the speech described by (8a). That is, (8b) provides more details about (8a). Only under this circumstance can the internal process of an eventuality that guo presents be accessed. This point is similar to that in regard to the perfective le (Wu 2005b) because the experiential guo and the perfective le are perfective markers, which present an event as a whole (e.g., Smith 1997: 66-69, Wu 2005c, etc).

The temporal relations in the two examples above are determined by cue phrases. In (7b), zaidu ‘again’ indicates that an event is repeated at a later time. This cue phrase tells us that (7b) occurs after (7a). In (8), encouragement can be part of a speech. This ‘part of’ relationship advises that (8b) provides more details about (8a), which specifies temporal inclusion.5

A crucial question arises at this point, i.e., whether the experiential guo directly determines temporal relations. The two examples above tell us that the answer is no. The experiential guo does not directly determine temporal relations. If it did, it would be difficult to explain why temporal progression is evoked in (8) whereas temporal inclusion is induced in (9).

Then, what determines temporal relations in the examples above? Following Asher and Lascarides (2003), I propose that rhetorical relations also determine temporal relations in Mandarin and that cue phrases or information, among other things, specify rhetorical relations, which in turn decide temporal relations. This proposal is supported by (7) and (8). (7c) is attached to (7b) to form a chunk of discourse, which in

\[5\] An anonymous reviewer asks if it is impossible for the sequences to manifest a temporal continuation in addition to temporal inclusion. According to my research on temporal relations in Mandarin, an elaborating situation can temporally precede a situation elaborated on only when the situation elaborated on is an achievement (Wu 2007a). For other cases, Elaboration indicates temporal inclusion, as discussed in this paper and others such as Wu (2005b, 2007b).
turn is attached to (7a) by *Narration*. As previously discussed, the cue for this rhetorical relation is *zaidu* ‘again’. *Narration* specifies temporal progression. This inference matches a native speaker’s intuition about the temporal relation in (7).

The ‘part of’ relationship discussed previously for (8) is referred to as a ‘subtype’ relationship (Asher and Lascarides 2003: 204-207). This cue information specifies that (8b) is attached to (8a) by *Elaboration*. *Elaboration* indicates temporal inclusion, which also fits a native speaker’s intuition about the temporal relation in (8).

The function of the experiential *guo* in the two examples above is to set constraints on rhetorical relations. An eventuality presented by *guo* needs its event time to be explicitly specified so that the event time can be advanced. Hence, when a clause with *guo* is connected to the following clause by *Narration*, the clause with *guo* must contain a temporal phrase that specifies the event time. On the other hand, the internal process of an eventuality presented by *guo* cannot be accessed because *guo* is a perfective marker and a perfective marker presents an eventuality as a whole. However, *Elaboration* requires accessing the internal process of the elaborated eventuality. Therefore, only *Elaboration* can access the internal process of an eventuality presented by *guo* which is elaborated on.

What may occur in the case of a discourse with no cue phrase or cue information that can indicate any rhetorical relation? Let us look at (9).

(9)  
(a) women zuo guo zhe jian shi yi ci  
    we do Exp this CL thing one time  
    ‘We did this once.’

(b) zhe ci huoxu ye mei wenti  
    this time maybe also no problem  
    ‘Maybe, this time, we won’t have a problem either.’

An anonymous reviewer suggests that *huoxu* ‘maybe’ in (9b) may be a cue phrase for informational background and that this possibility undermines the argument for the default function of the experiential *guo*. However, if *huoxu* ‘maybe’ is removed from (9b), the discourse remains coherent and (9a) still functions as informational background for (9b). The only difference is that without *huoxu* ‘maybe’ the speaker states, with certainty, that he or she will not have a problem this time. That is, what determines *Background* here is the experiential *guo*, not *huoxu* ‘maybe’.

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There is neither a cue phrase nor cue information in (9) to specify what rhetorical relation connects (9b) to (9a). An experience can serve as a piece of information, based on which an inference can be made. That is, an eventuality presented by guo serves as an informational background, represented by the rhetorical relation Background\(^7\), when the context does not specify otherwise. This is the default function of the experiential guo.

One valid question to ask about the default function of guo is whether the possibility of serving as informational background is a default function of the experiential guo only. Can the perfective le replace guo in (9) and the discourse remain coherent? The answer is no. If guo in (9) is replaced with le, then the discourse becomes incoherent, as shown in (10).

(10) a. women zuo le zhe jian shi yi ci
    we do Exp this CL thing one time
    ‘We did this once.’

    b. !zhe ci huoxu ye mei wenti\(^8\)
    this time maybe also no problem
    ‘Maybe, this time, we won’t have a problem either.’

This contrast between the (9) and (10) follows from the difference in the semantics of these two perfective markers. The experiential guo describes an experience. Drawing inferences from one’s experience is a natural process for humans. On the other hand, the perfective le specifies the completion or termination of an event. What naturally follows a completed or terminated event is another event, not an inference.\(^9\) This is

\(^7\) Asher and Lascarides (2003) do not distinguish different kinds of Background. The Background they propose is actually a temporal background, represented as Background\(_T\) in this paper and Wu (2004, 2005b, 2007a). However, as evidenced in this paper, another kind of Background, i.e., Background\(_I\), is required because these two kinds of Background specify different temporal relations.

\(^8\) A clause/sentence marked with ! means that this clause (or sentence) is a bad continuation to the one before. That is, a discourse consisting of a clause/sentences marked with ! and other clauses/sentences is incoherent.

\(^9\) An anonymous reviewer observes that (10) becomes coherent if yijing ‘already’ is added before zuo ‘to do’ in (10a) and suggests that it is not necessary that what naturally follows a completed or terminated event is another event, not an inference. I suspect that, in addition to temporal anteriority, yijing ‘already’ may also express current relevance.
why Wu (2005b) proposes that the perfective le by default indicates *Narration*. Can a completed or terminated event become an informational background? Yes, but only when some kind of pattern is formed. See (11) below.

(11) a. wo liang yiqi jingli guo/le wushu weinan
    I both together experience Exp/Pfv countless danger
    ‘We experienced countless dangers together before.’

    b. zhe ci huoxu ye neng taotuo
    this time maybe also can escape
    ‘Maybe, this time, (we) can also escape.’

In (11a), the sentence that serves as informational background can contain either the experiential guo or the perfective le. The difference between (10a) and (11a) lies in that (10a) describes a specific event whereas (11a) denotes non-specific plural events. Because (11a) describes a series of non-specific events, the sentences denote a pattern and humans can also draw inferences from a pattern. This is why (11) remains coherent even though the experiential guo is replaced with the perfective le in (11a), while (10) becomes incoherent once the experiential guo is replaced with the perfective le.

Other rhetorical relations can connect a clause to another with guo as long as they do not specify a temporal relation that violates Hypothesis (6). For example, an event that guo presents can serve as a reason. See (12).

(12) a. ni bu yong danxin xiaoxiao hui milu
    you no need worry Xiaoxiao will lose one’s way
    ‘You need not worry if Xiaoxiao will lose her way.’

similar to the use of the present perfect in English. In addition to temporal precedence, the English perfect also indicates current relevance. It has been observed that in certain dialects of American English, the adverb *already* can be used alone in the sentence to indicate current relevance. If *yijing* ‘already’ in Mandarin Chinese can also indicate current relevance, then it is natural to draw an inference from a sentence presented by *yijing* ‘already’ because drawing an inference is one of the ways to show current relevance. This proposal for the semantics of *yijing* ‘already’ has one advantage. When *yijing* ‘already’ and the perfective occur together, *yijing* ‘already’ will not be a semantic dummy with no semantic function at all, and instead it expresses current relevance.

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b. yinwei ta lai guo women jia haoji ci
because she come Exp we home several time
‘Because she has been to our home several times.’

The cue phrase yinwei ‘because’ in (12b) clearly specifies that (12b) explains (12a). Asher and Lascarides (2003: 160) suggest that, when the reason is an event, the reason occurs before the result. The difference between the temporal relation indicated by Narration and the one indicated by Explanation is that, without a temporal adverbial specifying otherwise, Narration says that the second event immediately follows the first one, while Explanation just says that the event serving as the reason occurs before the one as the result, but does not say how far apart these two events should be. This difference is why a sentence with guo needs a temporal adverbial to specify its event time when the following sentence is connected to it by Narration. The second event needs to know the event time of the first one so that it can follow the first one. A sentence with guo that serves as a reason does not need a temporal adverbial to specify its event time because an event presented by guo occurs in some indefinite past and this ‘indefinite past’ is able to guarantee temporal precedence.

To sum up, the experiential guo affects temporal relations via rhetorical relations. It specifies a default rhetorical relation, Background, which indicates temporal precedence. It sets two constraints on rhetorical relations. Firstly, the experiential guo presents an eventuality that occurs in some indefinite past and therefore its event time is unknown, unless the time is specified explicitly. Since Narration requires the event times of all of the events that occur in sequence, the event time of an eventuality that guo presents needs to be specified to be connected by Narration. Secondly, the experiential guo is a perfective marker, which presents an eventuality as a whole. Therefore, the internal process of an eventuality that guo presents cannot be accessed unless accessing the process is required. Since Elaboration is the only rhetorical relation that requires accessing the internal process, the internal process of an eventuality that guo presents can be accessed only when the eventuality is elaborated on.
4. AN SDRT ACCOUNT

The discussion in Section 3 reveals two points about the relationship between aspect markers and temporal relations in Mandarin. First, aspect markers do not directly determine temporal relations because a sentence with the experiential *guo* can have different kinds of temporal relations with the other sentences in the discourse. Secondly, aspect markers indirectly affect temporal relations via rhetorical relations. The semantics of the experiential *guo* determines the influence on rhetorical relations. To begin with, since *guo* denotes an experience and drawing inferences from an experience is a natural process for humans, the default function of *guo* is to indicate *Background*, informational background. That is, a sentence with *guo* serves as informational background unless the context specifies otherwise. Furthermore, since *guo* presents an event that occurs in some indefinite past, the event time of such an event needs to be specified so that it can be connected by *Narration*. Finally, because *guo* is also a perfective marker, the internal process of an event presented by *guo* cannot be accessed unless the event is elaborated on.

To capture the default function and the two constraints of the experiential *guo*, I propose an axiom and formalize the two constraints as in (13). I also propose the meaning postulate to infer a temporal relation from *Background* below.

(13)

a. Axiom for the Experiential *guo*

\[ \text{Background}(\beta, \alpha, \lambda) \]

b. Constraint on *Narration*:

\[ \text{Narration}(\alpha, \beta, \lambda) \land \text{guo}(\ldots)(\alpha) \rightarrow \text{TMP_LOC}(\ldots)(\alpha) \]

c. Constraint on *Elaboration*:

\[ \text{part_of}(e_\beta, e_\alpha) \land \text{guo}(\ldots)(\alpha) \land ?(\alpha, \beta, \lambda) \rightarrow \text{Elaboration}(\alpha, \beta, \lambda) \]

d. Meaning postulate for inferring temporal relations

\[ \Phi_{\text{Background}}(\beta, \alpha) \Rightarrow e_\alpha \prec e_\beta \]

Let us look at the formulae above. (13a) says that if \( \beta \) is attached to \( \alpha \) to form a discourse \( \lambda \) by an underspecified rhetorical relation and \( \alpha \) contains the experiential *guo*, then by default \( \alpha \) is the informational background of \( \beta \). This is a default inference because it can be over-ridden when there is explicit information in the context specifying otherwise.
(13b) says that if \( \beta \) is connected to \( \alpha \) to form a discourse \( \lambda \) by *Narration*, and \( \alpha \) contains the experiential *guo*, then \( \alpha \) must contain a temporal adverbial. This is a monotonic inference because it has to be obeyed.

(13c) says that if the event described by \( \beta \) is temporally included in the event described by \( \alpha \), and \( \alpha \) contains the experiential *guo*, then it must be *Elaboration* that connects \( \beta \) to \( \alpha \). This is also a monotonic inference because it cannot be violated.

(13d) says that, if \( \alpha \) is the informational background for \( \beta \), then the event time of \( \alpha \) must precede that of \( \beta \).

Let us demonstrate how the axiom, the two constraints, and the meaning postulate in (13) work under SDRT to derive correct temporal relations and to block incoherent discourse. The first example is the default function of *guo*.

(14) a. women zuo *guo* zhe jian shi yi ci
    we do *Exp* this CL thing one time
    ‘We did this once.’

b. zhe ci huoxu ye mei wenti
    this time maybe also no problem
    ‘Maybe, this time, we won’t have a problem either.’

In SDRT, the sentences in a discourse are translated into glue logic formulae first. The two sentences in (14) are translated into glue logic formulae as in (15).

(15) a. \( \pi_1: \text{we}'(x) \land \text{this}_\text{thing}(y) \land \text{guo}(\text{do}(x, y, e)) \land \text{once}(e) \)

b. \( \pi_2: \text{problem}'(z) \land \Diamond\neg\text{have}'(x, z) \)

When \( \pi_2 \) comes into this discourse, it needs an attachment site. There are two available here: one is \( \pi_1 \) and the other is at the top of the discourse. If \( \pi_2 \) is attached to the top of the discourse, then its relation with \( \pi_1 \) is not captured. This failure violates Maximal Discourse Coherence (MDC) (Asher and Lascarides 2003: 230-237). Therefore, it has to be attached to \( \pi_1 \). What rhetorical relation attaches \( \pi_2 \) to \( \pi_1 \) ? There

---

10 The first person plural pronoun and a definite NP are represented this way to simplify the formalism here. The logic formulae of the temporal adverbials in (18), the second person pronoun and the perfect in (22) are also simplified for the same reason. These are just simplifications and it is not suggested that they should be dealt with this way.
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is no cue phrase or any information in (14) to specify an attachment. Hence, (13a) comes into play and allows \( \pi_2 \) to be attached to \( \pi_1 \) by \( \text{Background}_I \). The SDRS for (14) is given below.

\[
\begin{align*}
\pi_0: \\
\pi_0: & \pi_1 x y z e \\
\pi_1: & \text{we}'(x) \land \text{this}_\text{thing}(y) \land \text{guo}(\text{do}(x, y, e)) \land \text{once}(e) \\
\pi_2: & \text{problem}'(z) \land \square \neg \text{have}'(x, z) \\
\text{Background}_I(\pi_2, \pi_1).
\end{align*}
\]

Then the rhetorical relation is interpreted in the Satisfaction Schema, as in (17).

\[
(17) \text{Satisfaction Schema for } \text{Background}_I (w, f) \quad \Box [\text{Background}_I(\pi_2, \pi_1)]_M (w', g) \iff (w, f) [K_{\pi_1} \land K_{\pi_2} \land \Phi_{\text{Background}_I(\pi_2, \pi_1)}]_M (w', g)
\]

(17) needs some explanation. \( K_{\pi_1} \) and \( K_{\pi_2} \) refer to the semantic contents of \( \pi_1 \) and \( \pi_2 \), respectively. \( \Phi_{\text{Background}_I(\pi_2, \pi_1)} \) refers to the meaning postulate for \( \text{Background}_I \) that connects \( \pi_2 \) to \( \pi_1 \). The Satisfaction Schema (17) means that \( \text{Background}_I(\pi_2, \pi_1) \) is true if and only if \( K_{\pi_1}, K_{\pi_2}, \) and the meaning postulate \( \Phi_{\text{Background}_I(\pi_2, \pi_1)} \) are all true.

The meaning postulate (13d) tells us that when the informational background of \( \pi_2 \) is \( \pi_1 \), then the event time of \( \pi_1 \) precedes that of \( \pi_2 \). This inference matches a native speaker’s intuition about the temporal relation of this example.

Next, let us look at an example of Narration.

\[
(18) \text{a. *(liang nian qian) zhangsan hui guo hunan laojia} \\
\text{two year before} \text{ Zhangsan return Exp Hunan hometown} \\
\text{‘Two years before, Zhangsan returned to his hometown in Hunan.’}
\]

16
b. yijiuwuba nian di zaidu fan xiang shi
1958 year end again return home time
‘When he returned home again at the end of 1958, …’

c. faxian renshiyifei
find everything change
‘(he) found that everything had changed.’

Again, the sentences in (18) are translated into glue logic formulae.

(19) π₁: Zhangsan’(x) ∧ hometown’(y) ∧ return’(x, y, e) ∧
two_year_before’(e) ∧ guo’(e)
π₂: home’(v) ∧ return’(u, v, e’) ∧ end_of_1958’(e’) ∧ u = ?
π₃: find’(o) ∧ o = ?
π₄: ∀p change’(p)

When π₂ comes into the discourse, it also has two available attachment sites, π₁ and the top of the discourse. If it is attached to the top of the discourse, then its underspecified anaphor will not be able to find an antecedent because the top of the discourse does not have any candidate. Hence, π₂ has to be attached to π₁. The cue phrase zaidu ‘again’ indicates that these two sentences are connected by Narration. Since π₂ is attached to π₁, the two arguments in π₁, i.e., x, y, are candidates for the antecedent to the underspecified anaphor in π₂. Since hometown cannot be the subject of return, u is resolved to x, which refers to Zhangsan.

When π₃ comes into the discourse, it has three possible attachment sites: π₁, π₂, or the top of the discourse. If it is attached to the top of the discourse, then its underspecified anaphor cannot find an antecedent. If it is attached to π₁, then its relation with π₂ is not captured. Both ways of attachment violate MDC. Hence, π₃ has to be attached to π₁. The cue phrase ....shi ‘when’ in π₂ indicates that π₁ is attached to π₂ by Background₁, a temporal background.

One point worth attention here is that π₃ is attached to π₂ by Background₁. Since π₃ is attached to π₂ to form a short discourse, π₂ cannot be attached to π₁ alone. Instead, π₃ is attached to π₂ to form a small chunk π₁2₃, which in turn is attached to π₁. Since π₃ is attached to π₂, the underspecified anaphor in π₃ is resolved to u, which in turn is resolved to x, which finally refers to Zhangsan.
Asher and Lascarides (2003: 283-287) suggest that a clausal complement elaborates on the verb taking the complement. Hence, π₄ is attached to π₃ by Elaboration. Since π₄ has to be attached to π₃ first, π₃ cannot be attached to π₂ alone. Rather, π₄ and π₃ form a short discourse π₃₄, which in turn is attached to π₂ to form π₂₃₄. Then, π₂₃₄ is attached to π₁.

The SDRS for (18) is given below. Narration(π₁, π₂₃₄) in the SDRS is interpreted in the Satisfaction Schema as in (21).

(20) Satisfaction Schema for Narration

\[(w, f) \models_{\text{Narration}(\pi_1, \pi_{234})} M(w', g) \text{ iff } (w, f) \models_{\mathbf{K}_{\pi_1} \land \mathbf{K}_{\pi_2} \land \Phi_{\text{Narration}(\pi_1, \pi_{234})}} M(w', g)\]

According to Constraint (13b), in the case of a sentence with guo that is connected to the following sentence by Narration, the sentence with
guo must contain a temporal adverbial. \( \pi_1 \) does contain a temporal adverbial, liang nian qian ‘two years before’. If the temporal adverbial is absent, i.e., \( \pi_1 \) does not include liang nian qian ‘two years before’, then the discourse will be ruled out as incoherent because of the violation of Constraint (13b).

Finally, let us look at an example where a clause with guo is connected by a rhetorical relation that specifies a temporal relation obeying Hypothesis (6).

(22) a. ni bu yong danxin xiaoxiao hui milu
   You need not worry if Xiaoxiao will lose her way.
   b. yinwei ta lai guo women jia haoji ci
   Because she has been to our home several times.

The two clauses in (21) are translated into glue logic formulae as in (23).

\[
\begin{align*}
\pi_1 & : \text{you}(x) \land \neg \text{worry}(x, y) \land y = \pi_2 \\
\pi_2 & : \text{Xiaoxiao}(z) \land \text{lose_one's_way}(z) \\
\pi_3 & : \text{home}(o) \land \text{our}(o) \land \text{be_to}(p, o, e) \land \text{many_times}(e) \land \text{guo}(e) \land p = ?
\end{align*}
\]

(22a) contains a verb that takes a clausal complement, which is represented as \( \pi_2 \). Again, \( \pi_2 \) is attached to \( \pi_1 \) by Elaboration, as discussed above. When \( \pi_3 \) comes into the discourse, it has four available attachment sites: \( \pi_1, \pi_2, \pi_{12}, \) and the top of the discourse. It cannot be attached to the top of the discourse because the underspecified anaphor \( p \) cannot find an antecedent. It cannot be attached to \( \pi_1 \) because the first person plural possessive in \( \pi_3 \) includes both the speaker and the listener and it is not reasonable to claim that the listener has been to his or her own home several times. \( \pi_3 \) cannot be attached to \( \pi_2 \) either because the relationship between \( \pi_1 \) and \( \pi_3 \) will be missed. Hence, \( \pi_3 \) is attached to \( \pi_{12} \) by Explanation, as indicated by the cue phrase yinwei ‘because’. \( p \) is resolved to \( z \), which refers to Xiaoxiao.

The SDRS for (22) is given below.
\(\pi_0\):

\[
\begin{align*}
\pi_{12} & \circ \pi_e \\
\pi_{12} & : \\
\pi_1 & : y(x) \land \neg \text{worry}(x, y) \\
\pi_2 & : y = \pi_2 \\
\pi_2 & : y = \pi_2 \\
\pi_2 & : \text{Xiaoxiao}(z) \land \text{lose_one’s_way}(z) \\
\pi_3 & : \text{home}(o) \land \text{our}(o) \land \text{be_to}(p, o, e) \land \\
& \text{many_times}(e) \land \text{guo}(e) \land p = ?/p = z \\
\end{align*}
\]

Elaboration(\(\pi_1, \pi_2\))

\(\pi_3\): home’(o) ∧ our’(o) ∧ be_to’(p, o, e) ∧ many_times’(e) ∧ guo’(e) ∧ p = ?/p = z

Explanation(\(\pi_{12}, \pi_3\))

\(\pi_0\)

Explanation(\(\pi_{12}, \pi_3\)) is interpreted in the Satisfaction Schema.

(25) Satisfaction Schema for Explanation

\[
(w, f) \left[ \text{Explanation}(\pi_{12}, \pi_3) \right]_M (w', g) \text{ iff } \\
(w, f) \left[ K_{\pi_1} \land K_{\pi_2} \land \Phi_{\text{Explanation}(\pi_{12}, \pi_3)} \right]_M (w', g)
\]

Asher and Lascarides (2003: 160) suggest that, when an event \(\beta\) explains \(\alpha\), \(\beta\) temporally precedes \(\alpha\). This temporal relation does not violate any part of Hypothesis (6). That is, the constraints in (6) are obeyed and the default function of \textit{guo} is irrelevant in this example. Hence, this discourse receives this temporal relation, which fits a native speaker’s intuition.

5. CONCLUSION

This paper argues that aspect markers in Mandarin do not directly determine temporal relations. Instead, aspect markers indirectly affect temporal relations via rhetorical relations. The experiential \textit{guo}
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influences temporal relations in three ways. First, because guo denotes an experience and it is a natural process for humans to draw inferences from an experience, a sentence containing guo serves as informational background, when the context does not specify otherwise. Secondly, because guo presents an eventuality that occurs in the indefinite past, the event time is unknown. In order to be connected to the following sentence by Narration, a sentence with guo needs a temporal adverbial to explicitly specify its event time. Thirdly, because guo is a perfective marker, which presents an eventuality as a whole, the internal process of an eventuality presented by guo cannot be accessed unless accessing the process is required. Other rhetorical relations can connect a sentence with guo as long as they do not specify a temporal relation which violates the three points above.

The first point above is formalized as an axiom to make a default inference for Background_1 for a sentence with guo. The last two points are formalized as two monotonic inference rules to guarantee that they are obeyed. The temporal relation indicated by the new rhetorical relation Background_1 is formalized as a meaning postulate, which is interpreted in the Satisfaction Schema in SDRT. Given the axiom, the two constraints, and the meaning postulate proposed in this paper, SDRT can accurately derive the temporal relations and block inherent discourse from being given an interpretation.

REFERENCES


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Temporal Relations and the Experiential Guo

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本篇論文探討經驗貌「過」對漢語時序關係的影響。本文論證：經驗貌「過」以下列方式透過修辭關係間接影響時序關係：一、「過」標明一基本之修辭關係——「經驗背景」，而這個修辭關係表示，事件發生的時間，在另一事件之前。二、「過」所引領之事件，如無必要，其內部過程不能被讀取。這兩點均是由經驗貌「過」之時貌語意而來。廣義而言，本篇論文顯示了，漢語中的時貌標記並不直接決定時序關係，而是以下面兩個方式，根據其時貌語意，透過修辭關係間接決定時序關係：一、標明一基本之修辭關係，二、提出應遵守之時序限制。這個結論，與本人(2004、2005b、2007b)的研究結論相呼應。

關鍵詞：時序關係、經驗貌「過」、語意-語用界面