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TEMPORAL INTERPRETATION IN MANDARIN CHINESE

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Abstract: This article presents an account of temporal understanding in Mandarin Chinese. Aspectual, lexical, and adverbial information, and pragmatic principles all contribute to the interpretation of temporal location. Aspectual viewpoint and situation type give information in the absence of explicit temporal forms. The main, default pattern of interpretation is deictic. The pragmatic principles are the Bounded Event Constraint, the Simplicity Principle of Interpretation, and the Temporal Schema Principle. Lexical and adverbial information can lead to non-default interpretations. Two other temporal patterns, narrative dynamism and anaphora, appear in text passages that realize the 'discourse modes' of narrative and description.

We state the semantic meaning of grammatical forms and explain the deictic pattern. Three times are needed to explain temporal interpretation, following Reichenbach (1947). Mandarin forms code the relation between a designated perspective time, or Reference Time, and Situation Time. These are typically marked redundantly in written texts. Relation to Speech Time is not coded linguistically, but conveyed by context.

Introduction.

In all languages, sentences convey information that allows people to locate situations in time. We discuss here how temporal information is conveyed in Mandarin.¹ The traditional account has it that Mandarin relies heavily on adverbs and pragmatics. The tradition is partly correct, but we show that aspectual information plays a key role as well. We state the different kinds of information, and the principles, that underlie

temporal interpretation. The principles are pragmatic in nature, since they rely on inference and context, as well as the information conveyed by linguistic forms.

As a starting point we ask what semantic information is needed for temporal location, and then consider the language resources that convey it. Our discussion is relevant to both tensed and tenseless languages, although we focus on Mandarin. As the resources of languages differ, so do the ways the principles are implemented in a given case. When no direct temporal information appears, aspectual information, such as whether a situation is ongoing or closed, gives pragmatic cues to the temporal location of the situation expressed.

Time is a single unbounded dimension. Like space, time requires an orientation point for location. The speaker is the canonical center of linguistic communication, and the canonical temporal orientation point is Speech Time, now. Thus the basic pattern of temporal interpretation is deictic: the situations expressed in sentences are located in relation to Speech Time.¹ This is the default interpretation of tense, and the default interpretation of tenseless languages. The default arises in a manner that we spell out below.

The linguistic forms that play a role in temporal location for Mandarin are adverbial, lexical, and aspectual. Temporal adverbs give direct information about location in time. Lexical forms such as modals and future-oriented verbs suggest temporal location. Aspect introduces information about situation type – events (run a mile, build a house) and states (believe, be happy) – and viewpoint (perfective, imperfective, neutral). Situation type and viewpoint express situations as discrete and bounded, ongoing and unbounded, or indeterminate. We propose three pragmatic principles that explain the deictic pattern: 1) the Bounded Event Constraint, 2) the Simplicity Principle of Interpretation, and 3) the Temporal Schema Principle. Adverbs and other information may supplement or override aspectual information. In this article we state the principles and discuss the relevant linguistic forms; we give natural examples

from written texts in Mandarin.

Not all temporal interpretation is deictic. Two important patterns are the temporal advancement of narrative, and the static interpretation that one finds in description and certain other contexts (Smith 2000b, 2003); perhaps there are others. Later in this article we show that all three patterns of temporal interpretation are found in written texts of Mandarin.

§1 discusses the deictic pattern and introduces the basic notions of aspect and temporal location; §2 presents an account of the deictic pattern, with examples of how it is realized in Mandarin; §3 introduces narrative and static temporal interpretation, with examples from Mandarin texts; §4 concludes.

§1. The deictic pattern: aspectual information and pragmatic constraints

The deictic pattern - in which Speech Time is central - is a linguistic universal, so far as we know. The deictic pattern locates situations either at Speech Time, or gives temporal locations in terms of their relation to Speech Time. The Present is located at Speech Time; the Past precedes it, and the Future follows.

In deixis, the default interpretation locates ongoing events and states in the Present (running, believe), and bounded events in the Past (run, break). The other possibilities are constrained, and require additional explicit information. The key factor underlying the deictic pattern is whether a situation is bounded or unbounded.

'Boundedness' is an aspectual notion: it refers to a property of the situations expressed in sentences. Bounded situations are temporally closed, by implicit or explicit bounds (ran, broke); unbounded situations are ongoing, temporally open (running, breaking).

Boundedness depends on both aspectual viewpoint and situation type. We will say more about this below.

The deictic pattern is stated in (1); and more compactly in (1'):

- (1) Default deictic pattern of temporal form and interpretation
 - a.) Ongoing events are in the Present: located at Speech Time
 - b.) States (unbounded) are in the Present: located at Speech Time
 - c.) Bounded events are in the Past: located before Speech Time
 - d.) Explicit temporal information may override a-c.

- (1') a.) Unbounded situations are located in the Present
 - b.) Bounded events are located in the Past

The temporal possibilities are not limited to the default statements in (1a.-c., 1').

Bounded events may be located in the Future, and states or ongoing events may be in the Past or Future. These departures from the pattern are expressed with additional information, as (1d.) indicates. However, no bounded events are located in the Present. This is an important, non-accidental, gap in the paradigm. It is due to a general constraint that events in the present cannot be bounded.

The realization of the deictic pattern depends on pragmatic constraints that involve both aspectual and temporal information. The restriction on events in the present arises from a pragmatic convention of communication that has semantic consequences. In taking the temporal perspective of the present, speakers follow a tacit convention that communication is instantaneous. The perspective of the present time is incompatible with a bounded event, because the bounds would go beyond that perspective. As Kamp and Reyle put it:

A present tense sentence describes an eventuality (situation) as occurring at the time at which the sentence is uttered, and thus at a time at which the thought is being entertained which the sentence expresses. So the thought must conceive the eventuality as it appears from the perspective of the time at which it is going on. A sentence which describes something as going on at a time - in the sense of not having come to an end when that time is up - cannot represent something as an event. For the event would have to be entirely included within the location time and thus would not extend beyond it (1993:536-7).

Due to this constraint, all simple present tense sentences express unbounded situations. We call it the Bounded Event Constraint (c.f. Smith 2003). The constraint is stated in (2):

(2) The Bounded Event Constraint:

Bounded events are not located in the Present.

The Bounded Event Constraint is an essential factor in the deictic pattern, since it partially explains clause (c.), the default for bounded events. Almost the same notion is called the 'punctuality constraint' in Giorgi and Pianesi (1997:163); for an earlier formulation see Lyons (1977).

The constraint explains the limited interpretations available for situations located in the Present in English. They may be ongoing events (John is talking); specific states (Ella is sick); or generalizing statives and generics (Tom feeds the cat, Elephants eat grass), but not bounded events. There are some exceptions, which have well-known special interpretations.³

Generalizing statives have the simple verb form. With present tense they express a pattern of situations rather than a specific event or state, and are thus semantically stative. Languages realize the Bounded Event Constraint in different ways. In Russian, sentences with the perfective viewpoint and present tense convey Future time; the Romance languages do not have a perfective present tense form.

The deictic pattern provides that the default for bounded events is Past rather than Future. We must also explain this. To do so we invoke a general Simplicity Principle of information processing. When faced with information that does not fully determine an interpretation, people choose the simplest interpretation to resolve it. The point has been made convincingly for perception. If people view a partial or indeterminate picture or shape, the visual system constructs a simple, complete percept (Kanizsa 1976). People construct a simple complete form rather than a complex or incomplete one. We adapt this finding as a simplicity criterion for the interpretation of temporal location.

The Past is simpler than the Future, we claim. The two are symmetrically related to Speech Time - the Past precedes, the Future follows. But the Future has the additional factor of uncertainty, a modal meaning (e.g. will, may) (Lyons 1977, Kamp and Reyle 1993). Due to the modal factor we take it that the future is more complex than the past. The prediction then is that people take sentences expressing bounded events to be in the Past unless there is explicit indication of the Future. And indeed, this is the case. We state the finding as a general simplicity principle that constrains interpretation.

(3) Simplicity Principle of Interpretation:

Choose the interpretation that requires the least additional information.

From the Gricean point of view (1975), this principle constrains the inferences that people make when they infer information that is not explicitly asserted. Given a sentence that says the minimum necessary, perhaps according to Grice's second Maxim of Quantity, one 'fills out' the interpretation (c.f. the Informativeness Principle of Levinson (1983), or the R-principle of Horn (1984)). Similar principles are used to constrain computational reasoning procedures.

We suggest that these two pragmatic principles underlie the deictic pattern of temporal interpretation. In the discussion below we state a third principle, the Temporal Schema Principle, that applies to clauses that have neither explicit temporal or aspectual viewpoint information. We refer to clauses without an overt viewpoint morpheme as 'zero-marked', following Klein et al. (2000).

Information relevant to temporal interpretation is coded primarily by adverbials, tense, and aspect, depending on the language. While this article focuses on Mandarin, we will occasionally compare it to English. The deictic pattern is expressed according to the resources of each language. We assume that Mandarin is tenseless, while English is a tensed language. In Mandarin, aspectual factors give key information, in a manner explained below. In English tense and aspect interact: the present tense conveys

unbounded situations in the Present and the past tense conveys situations in the Past.⁴

Since we are talking about interpretation, we implicitly take the viewpoint of the receiver rather than that of the speaker. However we assume a Gricean (1975) approach in which the calculations of speaker and hearer are essentially the same. In this article we try to state what and how information contributes to interpretation. We do not intend a psycholinguistic account, which would deal with processing: we make no claims about the actual order in which processing occurs.

§1.2 The keys to the deictic pattern: Aspect and temporal location

Aspect concerns the internal temporal structure of the situations introduced into a discourse. We assume that aspectual systems have two components, situation type and viewpoint, modeled within Discourse Representation Theory (Smith (1991/7), Kamp and Reyle (1993)). Situation type indirectly classifies a sentence as expressing a state or an event of a certain type. The categories of event and state are idealizations, types of situations with distinctive temporal properties. The situation types are realized at clause level by the verb and its arguments, the 'verb constellation'. Verb constellations associated with a given situation type have unique distributional and semantic properties, and are thus recognizable as covert linguistic categories in the sense of Whorf (1956).

Three two-valued temporal features differentiate the main classes of situations: dynamic/static, telic/atelic, durative/instantaneous. The distinction between events and states, and between telic and atelic events, can affect temporal interpretation. Events are dynamic, occurring at successive stages. States are static, holding consistently throughout an interval without endpoints - the changes into and out of a state are events in themselves. Telic events have natural endpoints; durative atelic events, or Activities, have arbitrary, potential endpoints.⁵ For situation type, a temporal schema models its defining features; the temporal schema is associated by rule with the appropriate verb constellations.

The features have linguistic correlates, as discussed by Vendler (1957) and others. The features of heterogeneity and homogeneity, based on part-whole relations, also form classes among the situation types. Telic and bounded events are heterogeneous because the part is different in kind from the whole. Only a complete telic event has the properties of the event itself, e.g., a part of 'walking to school' doesn't count as 'walking to school'. In contrast, states and atelic events sometimes pattern together linguistically.

Aspectual viewpoint makes available for semantic interpretation all or part of a situation; more precisely, the temporal schema associated with a situation type. The aspectual value of a clause is a composite of information from both situation type and viewpoint. The semantic meaning of each viewpoint must be stated for each language, but some generalizations can be made. The same situation may be described from different aspectual viewpoints as a language allows. Most viewpoints are usually grammatical at the clause level except for a few fixed contexts (though they may not be felicitous in a given discourse).

There are three classes of viewpoint: perfectives (open the door) make events visible as including endpoints, bounded. Imperfectives (opening the door) make situations visible without information as to endpoints, unbounded. Neutral viewpoints are flexible, giving enough information to allow a bounded or an unbounded interpretation. English does not have a neutral viewpoint; see below for Mandarin examples. We relate the neutral viewpoint to zero-marked clauses, those without an overt viewpoint morpheme.⁶ Viewpoint morphemes are optional in most clauses of Mandarin.

Boundedness and unboundedness may be expressed by situation type, viewpoint, and otherwise, according to the resources of a language. Bounds are usually conveyed by the perfective viewpoint; they may also be stated independently with adverbial or other information (Depraetere 1995).

In the two-component theory, situation type and viewpoint are distinct. Imperfectives (Leigh is cooking) and states (Leigh is happy) are similar – for instance,

both have the sub-interval property: when they hold for an interval I, they hold equally for any smaller interval of I. But they also differ. One important difference is that states can be taken as inchoative in certain contexts, whereas imperfectives cannot. To see this, compare Leigh was smiling when John broke the glass and Leigh was angry when John broke the glass; only in the latter can the main clause have an inchoative interpretation (Smith 1991/7).

The expression of temporal location in language requires an orientation point, as noted above; in the default case it is 'Speech Time', the moment of speech.⁷ The moment or interval at which a situation takes place, 'Situation Time', is understood in relation to Speech Time. Past situations precede Speech Time, future situations follow it. In language temporal location also involves another time, 'Reference Time'. Our understanding of temporal interpretation is informed by the views of Hans Reichenbach (1947), extended and modified by many, including Partee (1984), Hinrichs (1986), Smith (1991/7). In his discussion of tensed languages Reichenbach showed that the temporal location of situations involves a designated Reference Time, in addition to Speech Time and Situation Time. The designated time conveys a temporal perspective from which 'the speaker invites his audience to consider the event' (Taylor 1977:203). We will show that the notion of Reference Time is relevant to Mandarin as well.

Situation Time may be a moment or interval, depending on contextual information. Situations are wholly or partially located at SitT according to their aspectual value. Bounded situations (perfective, cooked), are totally included in situation time ($e \subseteq \text{SitT}$); unbounded events (imperfective, is cooking) and states (believe) overlap or surround it ($e \cap \text{SitT}$). This insight goes back at least to Jespersen (1931:79). Another account of aspect and temporal location is given by Klein (1994) and Klein et al. (2000). In this account aspect codes the relation between the run-time of a situation and Topic Time, a designated reference time.⁸ For perfective events, the event is totally included within Topic Time; for imperfectives the situation overlaps Topic Time.

Reichenbach (1947) gave several kinds of evidence for Reference Time; he focused on the English tense system. One piece of evidence is the contrast between sentences in the past tense and the present perfect.⁹ Another is that Reference Time clarifies the temporal relations between the situations expressed in language. Adverbial clauses and other contexts give information that locates situations relative to one another. Using the notion of Reference Time, Reichenbach shows that overlapping situations share Reference Time and those in sequence do not. The phenomenon of shifted deixis also supports the notion of Reference Time. Deictic adverbials such as now, in 3 days, which normally anchor to the moment of speech, can anchor to a past (or future) time, as in Leigh sat down at the desk. Now he was ready to start work. In such contexts the shifted now suggests Leigh's perspective. Reference Time is the anchor for this perspective.

We take the view, along with Y. R. Chao, that 'Chinese verbs have no tense' (1948:54). In this we follow the traditional idea that the term 'tense' refers to a morpheme, either an inflection or auxiliary, that appears in the main verb phrase of a sentence and has a temporal meaning. Huang (1984) and others have claimed that Mandarin has a finite-nonfinite distinction, which might suggest that it has abstract tense. Hu et al. (2001) present strong arguments to the contrary; Lin (2003), discussing the semantics of temporality in Mandarin, agrees. We concur with the latter authors. We do not think that there is evidence for syntactic tense in the Mandarin language, nor for a systematic finite-nonfinite distinction between clauses. Tense as a linguistic category is discussed further in Smith, Perkins, and Fernald (2003).

The notion of a designated Reference Time is not dependent on tense, but is basic to temporal location in language. Indeed, it has explanatory value for Mandarin. Reference Time partly accounts for the contrast between the perfective morphemes le and -guo, which have a temporal component. Adverbials such as yijing ('already') code a relation to Reference Time; and for temporal relations between situations and shifted

deixis, Reference Time is useful as well.

Aspectual morphemes may code the relation between Reference Time and Situation Time. They do not code a relation between Reference Time and Speech Time however. In Mandarin, the latter relation is inferred from information in the text and/or context. In tensed languages such as English, tense codes the relation between Reference Time and Speech Time. English forces a choice between present and past present tense for states (The Great Wall is/was impressive). Mandarin does not. What differentiates Mandarin from a tensed language, then, is that the grammatical forms relevant to temporal location do not relate Reference Time to Speech Time.

§2 Temporal information in Mandarin

In this section we discuss the temporal information conveyed by aspect, adverbs, and certain specific lexical forms in Mandarin. We then show how the deictic pattern is realized. Although our presentation is relatively informal, we are interested in an account that can be developed formally within Discourse Representation Theory, which constructs a dynamic representation of the information conveyed in discourse. Syntactic surface structure is the input to the construction rules of the theory. The rules for temporal information enter situation entities, times, and their relations into semantic representation.

§2.1 Reference Time in Mandarin

The aspectual viewpoint morphemes of Mandarin give both aspectual and temporal information. Temporally, le and -guo indicate different relations between Reference Time (RT) and Situation Time (SitT). Le conveys that the SitT interval is simultaneous with RT; -guo conveys that SitT precedes RT, at a different interval. For instance, consider the constructed examples below; the translations are approximate:

- (4) a. Ta dale majiang.
She play LE mahjong.
She played / has played mahjong.
- b. Ta daguo majiang.
She play GUO mahjong.
She has played mahjong (at least once, at some past time).
- c. Ta jiele hun.
She contract LE marriage.
She got married (and probably still is married).
- d. Ta jieguo hun.
She contract GUO marriage.
She has been married (at least once).

The difference between these clauses is only partly captured by the translations using the English past tense and present perfect. More precisely, le conveys in (4a.) that the event is bounded, and that SitT is simultaneous with RT. Recall that bounded events are included in SitT. By the Bounded Event Constraint, the default interpretation is Past: SitT and RT precede the time of speech. In (4b.), -guo conveys that there is at least one time included in SitT, that the event takes place at that time; and that SitT occurs before RT. Again the situation is Past by default.¹⁰

Adverbs such as yijing ('already') and cai ('have just') convey that an event or state precedes Reference Time:

- (5) a. Ta yijing zou le.
He already left LE.
He has already left.
- b. Wo cai dao.
I only just arrive.
I have just arrived.

The temporal meaning of these adverbs is to locate a situation at a SitT before RT.

One reason that Reichenbach (1947) posits three times for tense is that past perfect sentences require three times for temporal interpretation, as noted above. Mandarin too has sentences that require three times. We give as an example a sentence with a past adverbial and the aspectual morpheme -guo, as in (6); we owe the examples to Haihua Pan:

- (6) San nian qian ta (jiu) quguo Meiguo.
 Three year ago he (just then) go GUO America.
 He had been to America 3 years ago.
 He (just then) went to America 3 years ago.

For some speakers the sentence has two readings, like the English translations. One reading requires three distinct times: Reference Time is '3 years ago', prior to Speech Time; this time is indicated by the adverb. The time of leaving, Situation Time, is prior to RT, indicated by -guo. In the other reading, SitT and RT are the same, and prior to SpT.¹¹ To take a somewhat clearer case, an explicitly past sentence with yijing ('already') indicates a prior SitT, as in (7):

- (7) San nian qian ta yijing quguo Meiguo.
 Three year ago he already go GUO America.
 He had already gone to America 3 years ago.

These examples show that three times are needed for the temporal interpretation of some Mandarin sentences.

Reference Time is also needed to model the relations between situations expressed in Mandarin. The context of a clause gives information that locates situations relative to one another, as in (8), from Mangione and Li (1993):

- (8) Ta chile fan cai zou de.
 She eat LE rice only then go DE.
 Only after eating did she go.

The structurally determined RT for 'going' is the time of 'eating' (1993:67). The two events occur in sequence, or overlap. Overlapping situations share Reference Time; those in sequence do not. Thus RT provides a locus for relating situations in a principled manner, explicated for English in Hinrichs (1986).

The final argument we make for RT comes from clauses with shifted deictic forms. Deictics normally anchor to Speech Time; but they can also anchor to a different time. Shifted deictics convey the speaker's perspective at a designated Reference Time. We present as an example a fragment from a novel. The speaker contrasts her current good fortune with her earlier, rough life in Shanghai; the shifted deictics are in bold. This

fragment comes from one of the naturally-occurring, written texts that we examined for this article. The translations are our own, some adapted from published bilingual editions, but all checked with native speakers. The end of this article lists details in Sources of Text Examples.

- (9) a. ...xiang dao gei nage sha qian dao keren da bachang de shi,
...think to give that kill 1,000 knife guest big slap DE incident,
- b. zhongzhong bu xing ren de qingjing
manner unfortunate person DE situation
- c. he xianzai shenghuo yi bijiao
with current life one compare
- d. zhen shi bu shen huishou.
really be boundless comparison.
- e. Wo xianzai suoxing nenggou jia gei Bi Xiansheng....
I now simply able marry to Bi Mr.

...thinking back to the time when I slapped that violent killer guest, of being a person unlucky in every imaginable way, and comparing it to my current life, it was really a boundless difference. Now I could simply marry Mr Bi..

Here the writer uses xianzai ('current', 'now') to talk about her state of mind at a time in the past.

We will assume that Reference Time plays a role in the temporal interpretation of Mandarin sentences. In the default case, Reference Time is the same as Situation Time, the moment or interval at which a situation occurs. Reference Time may be given linguistically or contextually. Note that Reference Time alone does not specify temporal location because it is not anchored to Speech Time or another orientation time. In Mandarin the relation of Reference Time to Speech Time - temporal location - is specified with explicit temporal information or determined pragmatically. We also assume that the default Reference Time is now.

§ 2.2 The linguistic resources of Mandarin

We discuss aspectual, adverbial, and lexical information, all of which contribute to the determination of temporal location. The locus of the discussion is the clause. We treat each clause separately, noting complement clauses as dependent on a main verb. In some cases the nature of the main verb determines the temporal interpretation of the complement clause. We discuss complement clauses only briefly; see Lin (2003) for a detailed account of the temporal semantics of complements and other dependent clauses.

Here and below we give examples from written texts. The examples come from an informal study in which we analyzed intensively six complete discursive articles from current newspapers and magazines. The articles exemplify standard written Chinese style. A dozen other texts were also analyzed, though less intensively. The texts used in the intensive study were published in Hong Kong, though some are by mainland authors. Three are editorials from the Ming Bao, a staid newspaper which serves as stylistic model for Chinese literature students. Three longer articles come from the Ming Bao Yuekan (Ming Pao Monthly), Yazhou Zhoukan (Asiaweek), and Qianshao Yuekan (Frontline Monthly). We deliberately avoided articles in the slangy, Cantonese-influenced style popular in Hong Kong tabloids and comic books. Instead, we chose articles in the standard written Chinese which is very close to spoken Mandarin. Chinese writers, regardless of dialect, are taught to write in this prestigious style.¹²

§2.2.1 Aspect

Aspectual viewpoints are conveyed in Mandarin by verbal le, the experiential toneless -guo; the aspectual morpheme zai, the toneless suffix -zhe; and by zero-marked clauses.¹³ For each one, we state semantic meanings that are compatible with the range of pragmatic interpretations that arise. We assume that the semantic meaning is associated with each morpheme. We give summary, uncontroversial characterizations

here; these morphemes have been discussed at length by many authors and our main interest is their contribution to temporal interpretation.¹⁴ Recall that in our approach aspectual viewpoint makes semantically visible all or part of a situation, at Situation Time. Situation Time is located at Reference Time unless the two are explicitly differentiated.

Sentences with perfective morphemes express bounded situations. The verb suffixes le and -guo are perfective. Perfectivity is also conveyed by Resultative Verb Complements such as the suffix -wan ('finish'), (and by reduplication in a construction known as the Tentative which is not considered here). Le conveys that an event is bounded, although the boundary need not coincide with the completion of a telic event; (see examples in Smith (1994), Wu (2003)). The event is contained in SitT, SitT=RT. Le appears with event verb constellations, which we take to include inchoatives.¹⁵

Clauses with -guo convey that SitT precedes RT. For reversible situations -guo codes a discontinuity such that the resultant state no longer obtains (Chao 1968). Often indefinite, -guo conveys that a situation must have obtained at least once. It appears with event verb constellations, and, much more rarely, with state verb constellations.¹⁶ Guo clauses have another aspectual component: they are stative, focusing on the state that arises after a situation has taken place; (has had the experience of being married / playing mahjong / eating snake). Like statives generally, such clauses do not advance narrative time. The verb constellation of a -guo clause is often dynamic at the basic level of interpretation, so that such clauses are derived statives. (Basic level and derived situation types are discussed in Smith 1991/7). Following Mangione and Li (1993), and Klein et al. (2000), we model the temporal meaning of -guo and le with two times, the time at which a situation occurs and a designated Reference Time. Guo locates Situation Time before Reference Time, whereas with le, and the other aspectual morphemes, Situation Time and Reference Time are simultaneous.

Sentences with imperfective morphemes express unbounded situations. Zai is a

progressive imperfective, appearing with event clauses in preverbal position. In contrast -zhe is a more restricted imperfective, used often for resultatives of situations, end locations of motions, or for backgrounding; it is more common in subordinate clauses than in subordinate clauses. Clauses with zai have an ongoing meaning, due to their dynamic nature. Zhe clauses are static. SitT is simultaneous with RT for both imperfectives.

The zero or \emptyset morpheme conveys a neutral aspectual viewpoint: it gives enough information to allow either an open or a closed interpretation. The notion of a neutral viewpoint for Mandarin is discussed in Smith (1991/7, 1994). The information focused by the neutral viewpoint includes, for events, a single endpoint and a single optional stage (for duratives). For states, the neutral viewpoint focuses a stretch of the state; since states have the sub-interval property this is enough to count as an instance of the state.

We summarize informally the aspectual and temporal information conveyed by the four overt viewpoint morphemes, and the zero aspectual morpheme; the term 'situation' includes events and states.

(10) The aspectual morphemes of Mandarin:

le: bounded event, if telic not necessarily completed, included within SitT; at RT.

-guo: bounded prior situation; included within SitT; before RT.

zai: unbounded event in progress; surrounding SitT; at RT.

-zhe: unbounded situation; surrounding SitT; at RT.

\emptyset zero: events - initial endpoint and internal stage;

states - internal stage; partially included within SitT; at RT.

These summaries focus on boundedness and relation to temporal location only.

We now give a more formal statement of the semantic meaning of clauses with aspectual viewpoint morphemes.¹⁷ We need semantic meanings that are flexible enough to underlie pragmatic interpretation. The formal meanings stated below deal only with the

temporal and aspectual; they do not cover the distributional range of the morphemes or the subtle additional meanings that arise in certain contexts.

We assume a DR Theory approach in which construction rules interpret syntactic structures. Syntactic structures license the entry of entities and other information into the developing representation of a discourse, the Discourse Representation Structure (DRS). Let us say that a clause consists of a syntactic structure ϕ that expresses a situation \underline{e} , and an aspectual viewpoint morpheme. A structure ϕ licenses the entry of a situation entity \underline{e} into the DRS, with the properties focused by the aspectual morpheme that appears. Recall that the aspectual morphemes make all or part of a situation visible for semantic interpretation. Aspectual morphemes also indicate a relation between Situation and Reference Time; we symbolize Situation Time as t_1 , Reference Time as t_2 .

There are three parts to the formal statements below. We state first the relation between t_1 and t_2 that is conveyed by the aspectual morpheme; for all but -guo, $t_1 = t_2$. The situation entity \underline{e} expressed by a clause ϕ is associated with the appropriate situation type, by providing that a given \underline{e} belongs to the class of situations with the properties of the appropriate event or state situation type (E or S). In some cases \underline{e} is related to the complete notion of the event, \underline{e}' .

Additional information about \underline{e} varies with the viewpoint. Perfective viewpoints focus situations with visible endpoints, so that all of \underline{e} is included in the SitT (t_1); symbolized as $e \subseteq t_1$. Imperfectives focus situations without endpoints, so that \underline{e} overlaps SitT; symbolized as $e \circ t_1$. The neutral viewpoint focuses the initial endpoint of a situation and, for durative situations, at least one internal stage. The part focused is included in Situation Time ($t_1 \subseteq e$); other parts, if any, are not included. This partial information allows for the indeterminacy of the neutral viewpoint; $I(\underline{e})$ indicates the initial endpoint of an event.

(11) Semantic meaning of the Mandarin aspectual viewpoint morphemes

a.) $\phi \underline{e}$ is true iff $t_1 = t_2$ & $\exists e \exists e' [e' \in E \ \& \ e \leq e' \ \& \ e \subseteq t_1]$

- b.) ϕ -guo is true iff $t_1 < t_2$ & $\exists e [e \in E/S \ \& \ e \subseteq t_1]$
- c.) ϕ zai is true iff $t_1 = t_2$ & $\exists e [e \in E \ \& \ e \cap t_1 \neq \emptyset]$
- d.) ϕ -zhe is true iff $t_1 = t_2$ & $\exists e [e \in E/S \ \& \ e \cap t_1 \neq \emptyset]$
- e.) ϕ \emptyset is true iff $t_1 = t_2$ & $\exists e \exists e' [e' \in E \ \& \ I(e') \subset e \ \& \ t_1 \subseteq e];$
 $\exists e [e \in S \ \& \ t_1 \subseteq e]$

We unpack these statements in words. Condition (a.) says that ϕ le conveys the following information: (1) SitT=RT; (2) the entity e expressed by the clause ϕ le belongs to the class of event entities E, and e consists of all or part of the complete situation expressed as e'; this allows for bounded but incomplete telic situations; (3) e is included in the moment or interval SitT (t_1). Condition (b.) says: ϕ -guo conveys that SitT precedes RT; that the entity e expressed by the clause ϕ le belongs to the class of event or state entities E/S, and that e is entirely included in the moment or interval t_1 . Conditions (c.) and (d.) differ only in that zai is available for events, -zhe for events and states; in both e overlaps t_1 . Condition (e.), for the zero morpheme, says: SitT = RT; the entity e belongs to the class of state or event entities E or S, and for events, e includes the initial endpoint and allows that other parts of the event be included; SitT (t_1) includes all or part of e. This statement accounts for the indeterminacy of the neutral viewpoint, since e may or may not extend beyond SitT.

Situation type is realized by the verb constellation; see Smith 1991/7, 1994 for discussion of situation types in Mandarin). The main situation type categories are events and states. Telic events have natural endpoints, atelic events have arbitrary potential final endpoints. States and atelic events differ, though neither is telic (c.f. Smith 1999). Atelic events such as walking and chuckling are only partly homogenous - 'only down to a certain size' as Taylor (1977) comments. Instantaneous events consist of a single point; states have no endpoints.

The category of state includes generalizing/habitual and generic sentences. Such

sentences may have the basic verb constellation of an event or a state. They are semantically stative, expressing a pattern rather than a particular situation. As noted by Krifka et al. (1995), generalizing stative clauses have habitual adverbs or allow them to be added without changing the sense of the clause. The adverbs include zong ('always'), mei tian ('every day'), changchang ('often'). Generalizing clauses can also be rephrased as mei ci X, Y ('whenever X, Y').

Event verb constellations may appear with all four of the aspectual morphemes, though they frequently appear without any of them. State verb constellations may have -guo or -zhe only rarely and under very restricted conditions (Chao 1968:664-8). Zero-marked clauses have a consistent default interpretation. The default is this: Verb constellations that express telic and/or instantaneous events are taken as bounded; state verb constellations are taken as unbounded; activity events (run, cook) are unbounded. Strikingly, these interpretations accord with the temporal schema of each situation type. They are the basic-level interpretations of events and states, and thus the ones interpreted as default. Explicit temporal information can override the default.

The default interpretation of zero-marked clauses appears as a pragmatic principle in our interpretive account.

(12) Temporal Schema Principle:

In a zero-marked clause, interpret a verb constellation according to the temporal schema of its situation type, unless there is explicit or contextual information to the contrary.

Note that these interpretations are in accord with the Bounded Event Constraint. Zero-marked clauses are very common; a study of Mandarin narrative finds that telic clauses with neutral viewpoint are the norm (Yang 2002: 83, 117). An earlier version of this account is given by Smith and Erbaugh (2000).

In a related approach, Bohnemeyer and Swift (2001) posit a notion 'event realization' which triggers a 'default aspect' viewpoint: perfective for telic events and imperfective

for atelic events and states; Lin (2003) adopts the idea. There are some differences between this view and our own. 'Default aspect' interprets zero-marked clauses in terms of particular aspectual viewpoints, whereas our approach is more flexible. The Temporal Schema Principle gives the default interpretation of zero-marked clauses, using the properties of situation type schemas. But we also provide that additional information in a clause can override the default.

In certain contexts, zero-marked clauses may be interpreted as bounded (perfective) or unbounded (imperfective).¹⁸ Context may give information which pragmatically suggests a perfective or imperfective interpretation. For instance, if a telic event is expressed in a context suggesting the Present, it may be taken as Future. Or, in answer to a question that explicitly expresses an ongoing event, or in the scope of a present adverbial, a zero-marked telic event clause might have an ongoing Present interpretation. This is especially relevant since Mandarin prefers to answer a question with a verb, rather than with an equivalent to 'yes' or 'no': Women (jintian) qu bu qu? Qu. ('We (today) go not go?' 'Go'; in more colloquial English: 'Are we going (today)?' '[We're] going'.)

The default principle must be related to the semantic meaning of a zero-marked clause. The Temporal Schema Principle is a default. It allows that zero-marked clauses have a flexible interpretation: depending on context, zero-marked event clauses may be taken as open or closed.

We assume that the information conveyed by a clause is interpreted by construction rules from syntactic surface structure, and introduced into a semantic representation such as that of Discourse Representation Theory. The situation type of a clause is composed from the verb constellation and associated with a temporal schema. Rules license the entry of situation entities in the representation, together with conditions stating their temporal properties. Aspectual morphemes, including the zero morpheme, appear under the Aspect node in the syntactic tree. They license the introduction of times

and conditions that specify their interpretation into an ongoing Discourse Representation Structure (Smith 1991/7, Kamp and Reyle 1993). The interpretation is determined by the semantic meanings of the relevant morphemes and verb constellations, and by the pragmatic principles stated above.

§ 2.2.2 Lexical information: verbs and modal verbs

Lexical information relevant to temporal location is conveyed by Resultative Verb Complements, by past- and future-oriented verbs, and by modal verbs. We list here some of the main factors that make a difference in interpretation.

Resultative Verb Complements (RVCs) appear with many event verb constellations. RVCs are verb suffixes that add lexical and aspectual meaning to the verb constellation. RVCs such as -wan ('finish') convey that the final endpoint of a telic event has been reached. Examples, with RVC in bold, include Ta zuo**wan**le gongke ('She has finished her homework', literally 'do-finish'). There are also 'result' RVCs. They specify the result state of an event and convey that the state was reached, as in dapole huaping ('break the vase' - literally 'hit-break'), lachangle shengzi ('stretch the rope out long' - literally 'pull-long'), Zhangsan shasi ta le ('Zhangsan killed him' - literally 'kill-dead'). Other RVCs are directional, specifying the direction of action laxia lai ('pull down' literally 'pull down come'). RVCs of completion or result give explicit information of boundedness. Both Yang (2002) and Christensen (1994) find that most main clause narrative events occur with Resultative Verb Complements.¹⁹

Temporal information is also conveyed by future-oriented verbs such as jihua ('plan to'), zhunbei ('prepare for' 'plan to'). These verbs are modal in nature. Their complements express attitudes and plans, projected and unrealized situations; the meanings are only indirectly temporal. However, the temporal strand affects the interpretation of complement clauses.

The default interpretation of a future-oriented verb complement is unrealized or future. It overrides the pragmatic principles stated above. (13) illustrates; the main verb zhunbei ('prepare for', 'plan to') expresses a present state. Superscripts indicate the type of situation expressed by a clause, Event (E) or State (S); complements are given in square brackets.

- (13) Wo zhunbei tian hei yihou wo he Zhangsan yiqi lai. S[E]
 I plan sky dark after I and Zhangsan together come.
 I plan to come with Zhangsan after it gets dark.

The verb zhunbei is future-oriented: it locates a clausal complement at a future time as unrealized. Pragmatic inference suggests that the event was realized, since there is no information to the contrary. The example is from Hu et al. (2001).

Future-oriented verbs appear in various contexts. In the scope of a past adverb they convey a future time from a past RT, a future-in-past. The fragment in (14), taken from a magazine article published in 2000, illustrates. We are interested in the clause of line (d.). The verb jueding ('decide') is a future-oriented verb with an unrealized complement; it is in the scope of the adverbial phrase in (a.) that specifies a past time. In this context jueding has the interpretation of future-in-past.

We note that this and other textual examples below do not offer the clarity and simplicity of constructed examples. They are often quite complex and redundant, as is true of many actual texts. However we believe that this makes them more interesting and relevant than constructed examples, not less so. Temporal location is very rarely ambiguous in written Mandarin.

- (14) a. Jiujiu nian jiu yue er ri,
 1999 September 2 day,
 b. Lianxiang zhaokai xinwen fabu hui xuanbu^E cong jiu yue yi ri qi
 Lianxiang hold news briefing announce from September 1 day begin

- c. zhengshi jiepin yuan zong gongcheng shi Ni Guangnan yuanshi,^E
official dismiss original chief engineer Ni Guangnan academy scholar
- d. bing jue ding jiaogei Zhongguo Kexue Yuan wu bai wan yuan.^E
and decide transfer to Chinese Science Academy 500,000 RMB.

On September 2, 1999, the Lianxiang Company held a press conference and announced the dismissal of its original chief engineer, Ni Guangnan, a member of the Chinese Academy of Sciences, effective September 1. It was also decided to transfer 500,000 RMB to the Chinese Academy of Sciences.

In this past context it is natural to infer that the decision was carried out and the transfer of funds made, that is, that the event was realized.

Classes of verbs with a temporal component include verbs of Future Having , e.g. yuzhi ('advance'), baozheng ('guarantee'); verbs of Future Situation e.g. tiyi ('propose'), jihua ('plan to'), zhunbei ('prepare to'); verbs of Wish and Desire e.g. yao ('want'), wangxiang ('covet'), xuyao ('need'), xiangwang ('yearn to'); verbs of Future Events, e.g. yugao ('predict'), xiang ('expect'), yuyan ('foretell'); verbs of Future Prevention, e.g. paichu ('preclude'), zuzhi ('prevent'); (c.f. Levin 1993).

Modal verbs also indicate futurity and affect temporal interpretation.²⁰ The modals hui ('can'), yao ('want', 'should', 'need', 'will'), and jiang ('will') have a clear temporal component: they convey a future time for the complement, as default. They differ somewhat: yao is primarily subjective, volitional; hui is predictive; jiang is used for scheduled, planned situations. The other epistemic and deontic modals tend to have a component of futurity, including ying(gai) ('should', 'must'), keneng ('possibly', 'may'), keyi ('may'). In (15i, ii, iii) the modals yao, jiang and ying appear; yao and ying have complex complement clauses. The modals are in emphasized.

- (15i) a. ...zhengfu he minjian yao you zugou de kongjian he shijian
...government and people should have enough space and time

shenru taolun S[S[E]]
to deep discuss

...the government and the people should have enough space

and time thoroughly to discuss....

- ii) a. Guotai sihu yijing renshi dao zhege yinsu de zhongao xing, S[E]
Cathay Pacific appear already realize this factor DE importance,
- b. jinnian jiang zhaomu ke zengjia zhi sishi ba ren S[E]
this year will recruit number additional 48 people
- Cathay Pacific appears to have realized how important this is.
This year it will recruit 48 additional people
- iii) a. ... ciwai, zhengfu geng ying kaolyu touzi
...in addition, government even more should consider invest
- b. chuangban geng duo de zai zhiyuan gong zixiu daxue, S[S[E]]
establish even more DE at worker work self improvement university,
- c. jin keneng ling geng duo ren jieshou gaodeng jiaoyu. S[E[E]]
maximum possible enable even more people receive higher education.
- ...in addition, the government should consider investing even more in
self study universities for workers, and to make maximum possible efforts
to enable even more people to receive higher education.

The modals have a clear temporal effect, locating the complement clause in the future. (In this context keneng is not a modal: it means ‘to the maximum extent’.) The futurity of these modals overrides the Temporal Schema Principle, which would apply since the clauses are zero-marked for aspectual viewpoint. We ignore dynamic modals such as neng (‘can’, ‘able to’), which are internal to a proposition (Lyons 1977) and not future-oriented. Explicit conditionals, e.g. ruguo (‘if’), jiaru (‘if’), jishi (‘even if’) also indicate a future, unrealized interpretation.

There is a great deal more to be said about the contribution of modals to texts; but this brief overview suffices for our purposes. Future-oriented modals affect the temporal location of a complement clause.

§2.2.3 Adverbs

Mandarin has several types of temporal adverbial. ‘Locating’ or ‘frame adverbs’ (‘Tuesday’) form a large class of adverbs that temporally locate situations. These adverbs

specify a time or an interval more or less precisely, and may locate situations at times other than the default. Their scope often extends beyond the clause in which they appear. In the fragment below an adverbial clause specifies a past event, which serves as temporal anchor locating the events and states expressed in the clauses that follow.

- (16) a. ...zai yijian bei foujue hou,^E Ni Guangnan bian kaishi xiang
 ... at idea BEI veto after, Ni Guangnan then begin toward
- b. Zhongguo Kexue Yuan lingdao konggao zhuyao fuze ren, ^{E(E)}
 China Science Academy leader accuse important responsible people,
- c. neirong cong geren gongzuo zuofeng dao yanzhong de jingji wenti.^S
 content from personal work style to serious DE economic problems.
- ...after his idea was vetoed, Ni Guangnan began taking accusations against major, responsible people to the leaders of the Chinese Academy of Sciences. The content (of his accusations) ranged from personal work style to major financial problems.

The adverbial clause in line (a.) sets up a past context, supported in the actual text by explicitly past adverbs in earlier clauses. The stative in line (c.) is anchored to the time of the adverbial clause.

There are also adverbs that appear as connectives between clauses, including yihou ('after', 'then'), jiu ('then', 'at once'), cai (1) 'just now', 2) 'only then'). Adverbs such as gang ('just now'), yijing ('already') also contribute temporal information, locating a situation before Reference Time, as we note above.

Frequency adverbs such as changchang ('frequently') are relevant to aspectual situation type and thus affect temporal location. When they appear in a clause, the clause is a generalizing stative rather than an event and taken as located in the present unless there is information to the contrary. Temporal adjectives such as xianshi ('current'), congqian ('previous') are also relevant to temporal interpretation.

§2.2.4 The deictic pattern for Mandarin

We state the forms that realize the deictic pattern in Mandarin, and then give examples of the main cases. The possibilities are arranged in terms of their relations to speech time.

(17) The Deictic Pattern in Mandarin

- a. Present Situations are unbounded, located at Speech Time:
expressed by:
 - i) Clauses with aspectual zai or -zhe;
 - ii) Clauses with state or activity verb constellations,
zero-marked;
 - iii) Generalizing/habitual clauses, zero-marked.
- b. Past Situations are bounded, located before Speech Time;
expressed by:
 - i) Clauses with aspectual le or -guo and/or RVC;
 - ii) Clauses with telic event verb constellations,
zero-marked.
- c. Other Cases:
 - i) Clauses with unbounded situations in the Past or Future;
 - ii) Bounded situations in the future.expressed by:
Clauses with future modals;
Future-oriented verbs and expressions;
Clauses with, or in the scope of, temporal forms

The pattern follows the pragmatic constraints stated above. The Bounded Event Constraint locates bounded events in the past. The Temporal Schema Principle locates zero-marked states and activities in the present, zero-marked telic events and instantaneous events at a non-present time. Instantaneous events are past; they are intrinsically bounded since they consist of a single point. The Simplicity Principle of interpretation locates non-present situations in the past rather than the future.

The statement of the deictic pattern constitutes a set of predictions about temporal interpretation in Mandarin. We now show that the predictions are borne out, presenting examples of each case. We begin with the temporal location of unbounded situations, located at Speech Time. There are four cases. The first is that of a situation with one of the imperfective morphemes, zai and -zhe. The examples of (18 i, ii) illustrate:

(18) Imperfectively marked situations: located in the Present

i. zai

a. Xianggang de jiaoyu yijing guodu zhidu hua,^S
Hong Kong DE education already exceed-limit systematized,

b. yiqie dou zai zhaoban heli hua de moshi.^E
everything all ZAI indiscriminately-imitate 'rationalization' DE
model.

Education in Hong Kong is already too systematized, everything is all about indiscriminately imitating some model of 'rationalization'.

ii) -zhe

a. Tianjing zhong zhi you yi yan shuijing^S
Middle open courtyard middle only have one CL well,

b. bie wu qita sheshi.^S
other not have additional install.

c. Yanzhe bian fangzhe ji kuai xiyi ban,^S
edgeing side set ZHE several CL wash board,

d. bu da pingzheng de luanshi dimian shanyaozhe ^S
not very level DE cobblestone floor surface shine ZHE

e. yi dai you yi dai zhumin suo tachu de guangze.^S
one generation another one generation resident which tread DE glow.

The courtyard has only one well in the center, no other one has been drilled. Several washboards are set down along its sides, where the rough cobblestone surface shines with a gloss trodden smooth by generation after generation of residents.

The second kind of unbounded event is a zero-marked, atelic, durative event, of the Activity situation type. The examples illustrate. In (19 i), provided by J-S Wu from a corpus, the events with xing ('go') and zou ('walk') on lines (b.) and (d.) are of this type, in small capital letters. In (19 ii) the events in lines (g.) and (h.) are zero-marked, and unbounded. In (19ii), from an essay on disco dancing in Shanghai, a zero-marked activity event appears in (h.) with yaobai ('sway').

(19 i) Zero-marked Activity

- a. Na ren dangran daxi ruokuang^S yiwei zhaodaole daolu^E
That person certainly very happy mistakenly think find LE road
- b. genzhe zuji er xing dan zou dao houlai^E
following footprints go but walk until later
- c. zhe zuji yuanlai shi ziji liuxia de ^S
his footprints originally is self leave DE
- d. ta zoulai zouqu zhishi zai rao quanzi.^E
he walked back and forth only ZAI go in circle.

That person was certainly very happy, (and he) mistakenly thought he found a road and went following some footprints.

He walked until it was late. (It turned out that) the footprints were originally his own. He walked back and forth, he was only going in circles.

- ii) a. Xiong de you tui zhizhu diban, ^S
Bear DE right leg set floor,
- b. zuo tui xiangqian kuachu yi bu. ^S
left leg toward front stride one step.
- c. Xiong de zuo shou pingshen xiang ce qianfang,^S
Bear DE left hand flat extended toward side forward,
- d. shi zhi zuo gou zhuang, tiaodou zhuang;^S
index finger left hook position,
- e. you bi quqi,^S
tease position; right arm crook up,
- f. wu zhi zuo kai qiang zhuang^S
five finger make fire gun position;
- g. zai disike jiezuozhong^S
at disco rhythm inside,
- h. Xiong kuangfang di qianhou yaobai,^E
Bear wild style DI front back sway,
- i. Xiong chenjin zai ziji chuangzao de wudao zhong.^S
Bear deeply immerse in own create DE dance in.

Bear's right leg is set on the floor, his left leg striding one step forward.

Bear's left hand is flat out to the side, index finger hooked in a teasing pose. His right arm is twisted up, the five fingers imitating firing a gun. Inside the disco rhythms, Bear sways wildly back and forth, deeply immersed in a dance of his own creation.

Examples like this are rare in the discursive texts that we studied. However, clauses with zero-marked atelic events are common in conversation, where people are likely to talk about ongoing events. A printed text automatically imposes knowledge that the author wrote at some earlier time, making a past interpretation often the preferred one. In our texts event verb constellations tend to appear with information that indicates a past time e.g. an RVC, a past adverb, le, or -guo.

The next case is that of zero-marked states. We give an example from a newspaper editorial that appeared after the Seattle riots against the World Trade Organization. The clauses expressing states are zero-marked and located in the present, as predicted.

(20) Clauses with state verb constellations, zero-marked; located in the present:

- a. Buguo, Xianggang mei you biguan zishou de tiaojian.^S
However, Hong Kong not have close self-self DE situation.
- b. Xianggang shi shijie shang ziyou du zui gao de jingji tixi.^S
Hong Kong is world on freedom degree most high DE economic system.
- c. Miandui fada guojia gao keji chanpin,
Confront developed nation high technology product
- d. yiji linjin diqu dicheng ben laodong
along with neighboring region low-cost labor
- e. miji xing chanpin de liang mian jiaji,^S
intense type product DE two side pincer attack,
- f. Xianggang de chulu zhi you yi tiao,^S
Hong Kong DE out road only have one route,
- g. jiu shi nyuli xiang fada guojia kanqi,^E
that is make effort toward developed nation emulate,
- h. jiasu fazhan gao keji yu zhishi xing jingji.^E
speed up develop high technology and knowledge shaped economy.

However, Hong Kong does not have the option of closing its doors. Hong Kong has the freest economic system in the world. With high-technology products from developed countries and low-cost, labor-intensive products from its neighbors in a pincer attack, Hong Kong has only one way out: to make an effort to emulate developed countries and to speed up its high tech development and knowledge-based economy.

The last two clauses express unrealized events set in the Future. The linguistic cue is nyuli xiang ('make an effort toward'), a future-oriented expression.

Zero-marked generalizing statives are the third case. They are, as predicted, temporally located in the present - like other statives. We present three examples. (21i) contains an explicit frequency adverb; the clauses of (21ii-iii) make generalizations about classes of individuals and entities - women and polystyrene containers.

(21) Generalizing statives, zero-marked, located in the present

- i) a. Fu tachu Luohu Guanka
Just step out Lohu Customs
- b. zai Shenzhen Huoche Zhan chukou zong hui kanjian rentou cuandong, GenS
at Shenzhen railway station exit always can see people head assemble move
- c. qizhong bufu shenqing jiaoji de meiyang nyuzi qiaoshou shouhou GenS
among them not lack look anxious DE beautiful gaudy woman raise head wait
- d. zi Shenzhen He bian qianlai de ailang, GenS
from Shenzhen River other shore forward come DE lover.

Just stepping out from Lohu Customs at the Shenzhen Railway Station exit, (you) can always see a moving crowd not lacking in anxious-looking, beautiful, gaudy women, raising their heads and waiting for their lovers to come across from the other shore of the Shenzhen River.

- ii) a. ... cun zhong zhuyao jiedao ji shiji kanlai hen pingjing, S
... village within main street and market appear very peaceful,
- b. yixie nyuzi xietong xiao tong zai lu pang zouguo GenS
some woman in company child at roadside walk past
- c. huo zuo zai gongyuan liaotian, GenS
or sit at park chat,
- d. xiao hai ze zai pilin de qiu chang wanshua, GenS

child then at adjoining DE ball-field play.

...the village main streets and market look very peaceful, some women with their children walk past along the roadside or sit in the park chatting, their children playing in an adjoining ball-field.

- iii) a. Fapao jiao canju fangbian, GenS
Polystyrene food container convenient,
- b. chengben di GenS
price low,
- c. dan weihai ji da, GenS
but harm extremely great,
- d. shou re chao guo liushi du jiu hui GenS
receive heat exceed RVC 60 degrees then can
- e. shifang chu you hai zhi ai dusu, GenS
release out have harm cause cancer poisonous substances,
- f. you hui zaocheng wenshi xiaoying, GenS
also can create greenhouse effect,
- g. pohuai diqiu shengtai. GenS
damage earth ecology.

Polystyrene containers are convenient and cheap, but extremely harmful. Polystyrene releases carcinogens when heated above 60 degrees celsius; it can also create a greenhouse effect and damage the earth's ecology.

Although they have event verb constellations, the clauses are semantically stative because they involve a pattern of events rather than a particular event. No temporal location information is given. The interpretation is present, in accord with our predictions.

We now turn to the expression of bounded events. The deictic pattern predicts that such events are located in the past. In the first case the clauses are explicitly marked as perfective. Since the examples are from actual texts, they contain several kinds of information. (22i) has an RVC as well as a le; (22ii) has a past adverb, a date, a RVC and a le; (22iii) has an adverbial hou ('after') as well as an RVC.

(22) Clauses with RVC, perfective morpheme le

- i) Gongan Fa shiqule ke xinfeng de qiyue jingshen^E

Public Order Ordinance lose RVC LE can believe in DE contract spirit

The Public Order Ordinance lost all spirit of a believable binding contract.

- ii) a. ... zhengfu zao zai 77 nian tongguo le
... government early in 1977 year approve RVC LE

guwen gongsi de huanjing baogao.^E
consult company DE environmental report.

...as early as 1977 the government had already approved a consultant's report on the environment.

- iii) a. ... zhe shi wo he duo wei nianqing xuezhe jiaotan hou ^E
this be I and many CL young scholar exchange-talk after

- b. suo dedao de jielun.^E
which reach RVC DE conclusion.

... this is the conclusion which many young scholars and I reached after exchanging views.

In our texts, many event clauses are zero-marked: only a few have aspectual morphemes. We cannot discuss the reasons for such variation here, but we note that the presence of an aspectual viewpoint morpheme highlights a clause. Yang finds that redundant temporal marking is the norm: in his study, 67% of foregrounded clauses in narrative are explicitly marked with an adverb (51%) or both an adverb and le (16%). Only 9% of the clauses are marked with le alone (2002:162).

The next case is that of zero-marked clauses with telic event verb constellations. There are many examples of such clauses in our texts, usually with a past adverb. We first illustrate zero-marked event clauses without an adverb, in (23) i-e and ii-b.

(23) Zero-marked telic clause

- i) a. Bieyou dong tian de Fengxian Si Dalu Shena xiangkan shi ^S
Unique cave (open to) sky DE Fengxian temple Locana Buddha niche be

- b. Chang'an Shiji Si Shandao chanshi, Fahai Si zhu,
Chang'an Shiji Temple Shandao monk, Fahai Temple Abbot,

Hujian fashi, he Si Nong, Wei Ji, deng ren

Huijian daoist monk, and Minister of Agriculture, Wei Ji, and others

- c. fengming
send down orders
- d. zhuchi
take charge of
- e. kaizhi de lutian moyan xiangkan. E (E (E))
decorate DE open-air carved cliff image.

The Locana Buddha Niche at the unique temple of the Fengxian Si is an open-air niche, an image [of Buddha] which was carved in an open air cliff under the orders and direction of the Monk Shandao of the Shiji Temple of Chang'an, of Daoist Monk Huijian, the Abbot of the Fahai Temple; and Weiji, the Minister of Agriculture, as well as others.

- ii) a. ... wo fei dan xin li zancheng^S
... I not only heart inside approve
- b. erqie ye ceng weiwen E
but also before write article
- c. xiang huanqi Xianggang ge jie renshi S[E]
want rise Hong Kong every circle people
- d. dui Xianggang jingshen wenming de zhuyi.
toward Hong Kong intellectual cultivation DE attention.

I not only approve, but I, too, in past wrote articles calling on Hong Kong people from every walk of life to pay attention to intellectual cultivation.

The adverb ceng ('before', 'once', 'in past') in (23ii) reinforces the past interpretation.

The fragment in (24), which has a past adverbial with scope over several clauses, is more typical of what we found in our texts.

(24) Zero-marked telic clause with past adverb

- a. ... zai huihuang niandai, Wang Jizhi faming de Zhongwen da ziji E
... in glorious era, Wang Jizhi invent DE Chinese word processor
- b. rang Sitong feng guang wu xian....
allow Sitong prospects without limit....

...in that glorious era when Wang Jizhi invented the Chinese word processor, (this) let the Sitong Company (gaze toward) limitless prospects....

Example (23i) is from an illustrated guidebook to the Buddhist grottos of Luoyang; in

such a context, locating an event in the past is sufficient for understanding. (24) appears in a news magazine article, where more information about temporal location is appropriate; context locates 'that glorious era'.

Finally, there are cases of temporal interpretation that run counter to the predictions of the deictic pattern - they consist of unbounded situations in the past or future, and bounded situations in the future. The interpretations are based on explicit information in the immediate context: modals, future-oriented expressions, and adverbials.

We present here one example of each type, organized according to the type of situation that is temporally located; see also examples (13-16) above. The fragment in (25) illustrates states located in the recent past within the scope of the time adverbial jinnian ('in recent years'). (26) expresses an unbounded event in the past. The fragment is from a novel; very few instances of unbounded events appeared in our discursive texts.

(25) States in the Past

- a. Jinnian, Shenzhen jingji jisu fazhan,^E
Recent years, Shenzhen economy rapidly develop,
- b. Xianggang he Shenzhen liang di jiaotong fangbian,^S
Hong Kong and Shenzhen two place transportation convenient,
- c. renliu riyi pinfan,^S
people exchange increasingly frequent,
- d. jia shang xiaofei yu shenghuo zhishu shuiping chaju....^S
add on consumption and living index level difference....

In recent years, as the Shenzhen economy developed rapidly, transportation between Hong Kong and Shengzhen became convenient, the flow of people increased, and adding on the gap in standards of consumption and quality of life....

(26) Unbounded event in the Past

- a. Wo yi tou gongzuo,^E
I one head work,
- b. yi tou wenzhe yi zhen yi zhen guo li de yu xiang,^S
one head smell ZHE one burst one burst pan in DE fish fragrance,
- c. huang yu zai women Anhui shi mei you de...^S

yellow fish in our Anhui be not exist DE....

One part of me was working, one part was smelling wave after wave of the fragrant smell of the fish in the pan. Yellow croaker fish was something we didn't have back home in Anhui....

The zero-marked form gongzuo ('work') and imperfective wenzhe ('was smelling') express an ongoing activity event. These clauses could also be translated in the present, but as they occur in a reminiscence-based novel, they are conventionally taken as past. The next examples illustrate states and events in the future; both have an explicit future form. The future modals are stative. Square brackets indicate their complements.

(27) Bounded events in the Future

- a. Neidi jiangyu ben zhou liu quanmian jin yong S[E]
Mainland about to this Saturday completely forbid use

jiyong jiqi de fabao canju
disposable DE polystyrene food-containers....

This coming Saturday the mainland will completely ban use of disposable polystyrene food containers....

(28) State in the Future

- a. ...buguo zai siren qiye qiu cun de yali xia S
however in private business survive DE pressure under

- b. zhe jiang shi bu ke kangju de da qushi S[S[E]]
this will be not possible resist DE great trend

...however, as private businesses are under pressure to survive, this great trend will be impossible to resist...

Examples like these show that Mandarin has linguistic resources for the full range of temporal locations.

We comment briefly on the incidence of aspectual morphemes in the six texts that we studied most intensively. There were few: only 49 of the total of 7,640 characters were aspect morphemes. One editorial contained only one le, and no other aspectual morphemes; another editorial contained 20, or 40% of all aspect morphemes. Together

the six articles contained 39 le but just 2 progressive zai, 4 -zhe, and 5 experiential -guo. This is an average of one aspectual morpheme every 14 clauses, or 7% of clauses. These texts had fewer aspectual markers than appear in narratives, certain other genres, and probably in ordinary conversation.²¹ We emphasize that the default interpretations are just that: defaults, which may be overridden by contextual information. For instance, consider the following constructed examples which do not fit. Assume that both (a.) and (b.) are uttered in a present context; note the definite zhege ('this') in (a.) and mei ge ('every single') in (b.).

- (29) a. Wo chi zhege pingguo.
 I eat this apple.
 I'll eat this apple.
- b. Mei ge Zhongguo ren dou dai Mao Zhuxi xiangzhang.
 Every CL Chinese all wear Mao Chairman badge.
 Every single Chinese is/was wearing a Chairman Mao badge.

The event in (a.) is telic; we may interpret the sentence as a future situation, in which the particular apple will be eaten. The situation in (b.) is a generalizing stative; one takes it as referring to a period in the past, assuming that the proposition the sentence expresses is true. It is knowledge of Chinese history that determines the interpretation, as Professor L. J. Xu, to whom we owe these examples, points out. We suggest that sentences like this do not appear out of the blue, but typically have contextual support, including temporal information. Therefore they do not undermine our claims of default interpretation.

In the foregoing we have shown how deictic temporal interpretation is realized in Mandarin. We now widen our discussion to include other cases.

§3 Two other patterns of temporal interpretation

Although deixis is basic in language, the full range of temporal interpretation includes patterns other than the deictic. Two others (at least), 'continuity' and 'anaphora', are required. They are found in text passages of particular 'discourse modes'. The

discourse mode, proposed in Smith (2000a) and developed in (Smith 2003), characterizes passages of written texts according to linguistically-based features. Five modes are proposed: Narrative, Report, Description, Information, Argument.²² Each mode introduces certain types of entities into the universe of discourse, and follows one of three principles of temporal progression. The main types of entities are eventualities (states and events), generalizing statives, and abstract entities.

The analysis of discourse modes is developed for English; we will show that the same temporal principles apply to Mandarin. The similarity suggests that the discourse modes are realized in Mandarin. We cannot go into the matter more fully (see Smith 2003 for a detailed account of discourse modes).

The temporal modes, Narrative, Description and Report, progress by different temporal principles, discussed immediately below. Narrative primarily introduces event and state entities into a discourse. The situations are temporally related to each other according to their aspectual properties, and information specified by adverbs. In narrative tense conveys continuity. Description primarily introduces states and ongoing events into the universe of discourse, and temporally locates them at a single established time. Tense in description conveys a time anaphoric to a previously established time. Report primarily introduces events and states, and general statives; they are temporally related to Speech Time. In Report tense is deictic; this is the default, found in the atemporal modes as well.

The deictic pattern in Mandarin is discussed above; we focus here on other patterns of temporal interpretation. They too are found in passages of Mandarin texts. In our informal study we looked at novels and short stories, and informative texts such as travel and museum guides.

We begin with narrative. Narrative consists of consequentially related events, recounted in the sequence in which they occur - the main story line (Labov and Waletzky 1968, Moens 1987). The essence of a narrative is dynamism: as the events of the

narrative unfold in sequence, we understand that narrative time advances. The dynamism that advances narrative time is due to aspectual information, and to explicit time adverbials and inference. A narrative advances with bounded, perfective events and with explicit temporal adverbials. It fails to advance with states and ongoing events, unless additional information warrants an inference of advancement.

The standard narrative time is past, and tense in narrative is consistently past, including the past perfect. The information that tense conveys after the initial sentence of a narrative is continuity.

Narrative dynamism is modeled with a mechanism based on Reference Time. Time in narrative advances when warranted by aspectual or adverbial information. A narrative begins with a given RT. With a subsequent clause that expresses a bounded event, RT advances to just after the event. This principle delivers a result similar to the analysis of Klein et al. (2000), in which bounded events immediately precede RT. With states or ongoing event clauses, RT does not change: the situations are located at the current RT. For a clause with an adverbial, RT advances to the time specified by the adverbial. Additional information can license an inference of advancement. Rules for narrative interpretation in the framework of Discourse Representation Theory are provided in Kamp and Reyle (1993), Smith (2003); the two differ slightly.

The same interpretation of narrative dynamism is found in Mandarin, with adjustments for the resources of the language. This is not surprising. Narrative is surely universal, and narrative advancement depends on aspect and temporal adverbs. Information of both kinds is available in Mandarin, of course.

Bounded events are the key to narrative advancement. But in Mandarin, unlike English, event clauses need not be explicitly perfective. Narrative time is advanced by clause with perfective *le* and/or RVCs, and by zero-marked event clauses. No new mechanisms are needed to provide for this. By the Temporal Schema Principle, zero-marked event clauses are taken as bounded. With the principle that bounded events

advance narrative time, this predicts the dynamic interpretation of narrative. Clauses with -guo do not advance time: they are stative. Clauses with the imperfectives zai, and -zhe, and zero-marked clauses with state verb constellations, do not advance narrative time.

We state the interpretation as a principle for narrative dynamism in (30):

(30) Narrative Dynamism Principle:

a. Explicitly bounded event clauses, and zero-marked event clauses,
advance narrative time;

State and unbounded event clauses do not advance narrative time.

b. If e is a bounded event, RT_x immediately preceding:

$$RT_x < RT_y; e \text{ at } RT_y$$

This statement predicts the dynamics of narrative (Kamp and Rohrer 1983, Partee 1984) - an additional statement is needed for adverbial advancement. A more formal version of this principle mentions the types of entities typical of narrative passages (Smith 2003). Like other pragmatic principles, this one can be overridden by explicit information.²³

We give an example from a fictional narrative and a short narrative that appears in a discursive text. (31) illustrates the stark narrative pattern, without supporting adverbials. The time is conventionally past. The order of presentation and aspectual information convey the information necessary to interpret the relations between the situations. All the clauses are zero-marked, invoking the Temporal Schema Principle: telic event clauses express bounded events, atelic and state clauses express unbounded situations, unless there is information to the contrary. The events are numbered as they advance narrative time.

(31) Fictional narrative:

a. Ta hao rongyi ququ zhezhe de huichu shou lai, E1
He with difficulty turn turn twist twist DE pull out hand come,

b. shou li jiu you yige xiaoxiao de changfang bao, kuilyu se de, S
hand in just have a small small rectangular package sunflower green DE

- c. yi jing di gei Si Taitai. E2
 one movement give to Si Mrs.

With difficult twists and turns he pulled his hand out of his clothing. It held a small rectangular package of sunflower green. In one movement, he handed it to his wife.

The first event - 'pulling' the hand - is located at a contextually licensed Reference Time, RT_n. In context this RT follows RT_{n-1}, the RT licensed by the previous event. The state - there is a package - is also located at RT_n. The second event, handing over the package, follows at RT_{n+1}.

Narrative passages often appear in non-fictional, discursive texts. The following example is from an essay on the Shanghai Hotel.

(32) Non-fictional narrative

- a. Yige shou nanzi laidao 'Hua Ting'. E1
 A thin male come to 'China Room'.
- b. Ta duoshao you dian huangkong bu an di zoujin haohua de boli men, E2
 He more or less have a bit terror uneasy DI go in luxurious DE glass door,
- c. chuanguo shui sheng zongzong de da tang, E3
 pass RVC water sound gurgling DE great hall,
- d. zai P.R. shiying sheng, zong tai fuwu yuan de aimei de zhushi xia, E4
 at P.R. worker, main desk service worker DE muddled DE attention under,
- e. tajin er lou de chenghu xing de zoulang. E5
 step into second floor DE arc shape DE corridor.
- f. Ta kanjianle zoulang shang de yi pai zhaopian E6....
 He see RVC LE corridor above DE a row photographs....

A young man came to the "China Room". Terrified and uneasy, he walked through the luxurious glass door, passed through the main lobby which was filled with the sounds of gurgling water, and, under the muddled attentions of the young P.R. workers and reception desk personnel, stepped into the arc-shaped corridor of the second floor. He saw a row of photographs hung along the corridor....

The events are related to each other sequentially in these examples. Note that only the last event of (32) has an aspectual morpheme, perfective le with kanjian ('see-RVC', 'perceive').

We now turn to a temporal pattern which is neither dynamic nor deictic. In this case interpretation is static: situations are temporally located, but the time does not change. The static pattern is typical of the discourse mode of Description. In passages of Description, time is stable or suspended, without dynamism. Situations are located at a time already established in a text so that all the clauses of a given passage have the same Reference Time. Description passages appear in fiction, travel writing, and accounts of states of affairs. In the Description mode, tense is anaphoric to a time already established in the discourse.

The entities in Description are unbounded events and states. Often a locative adverb or other anchoring information appears at the beginning of a description. We also assume a tacit durative time adverb that has scope over the passage. Event verb constellations in passages of Description are atelic, sometimes by coercion due to the tacit time adverb. If motion is involved, it is without significant changes of state and there is no sense that time advances.²⁴ The pattern is stated in (33):

(33) Static Interpretation Principle

- a. States and unbounded events are located at an established time
- b. If e is a state or unbounded event, RT_x immediately preceding:

$$RT_y = RT_x$$

We illustrate with two examples. The fragment in (34) begins with an event that establishes the prior RT; this is the time of the description that follows. Recall that states surround their Situation Time, so that the interval during which a state holds is not necessarily limited to a given SitT. Pragmatically we infer that the states in (34) continue before and after the RT established by the event.

(34) Description

- a. ...zuo zhongren de Wei Lao Pozi dai ta jinlai le, E
 ...go-between DE Wei Old Wife bring her enter come LE,

- b. tou shang zazhe bai tousheng, wu qun, lan jia ao, S
head on braid ZHE white cord, black skirt, blue padded jacket,
- c. nianji dayue ershi liuqi, S lian se qinghuang, S
age about 20 six seven, face color pale,
- d. dan liang jia que hai shi hong de. S
but two cheeks still be red DE.

...old Mrs Wei, who acted as go-between, brought her in. Her hair was tied with white bands, she wore a black skirt, blue jacket and pale green bodice, and was about twenty-six, with a pale face but rosy cheeks.

The description in (35) is from an account of the great carved Buddha at Luoyang. The RT is present, simultaneous with Speech Time.

- (35) a. Dalu Shena Fo luoxing fa ji, S
Locana Buddha snail-like hair coils,
- b. shen pi tong jian shi jiasha,
body draped whole shoulder katsaya patchwork vestment. S
- c. ta zuiba shao qiao, cheng weixiao zhuang. S
his mouth slightly pulled upward, assume form of smile shape.

The great Locana Buddha is robed in a kasaya vestment, his hair is coiled in spirals, and the corners of his mouth are tilted slightly upward in a smiling expression.

The continuing RT may be past or present - or, in principle, future - according to the context of the passage. In a sense this pattern complements narrative dynamism: it applies to unbounded situations and locates them at a single time.

Three patterns of temporal interpretation have been demonstrated: the deictic, dynamic, and static. The deictic pattern is found in the discourse modes of Report, Information, and Argument. Report passages give an account of situations and their significance from the temporal standpoint of the reporter. Passages in the other two modes are essentially atemporal. They too follow the deictic pattern. See the Discourse Representation Theory account developed in Smith (2003).

§4. Conclusion

Temporal understanding in Mandarin, we have shown, is based on information of two kinds: the semantic meaning conveyed by aspectual, lexical, and adverbial forms; and pragmatic principles of interpretation.

The main pattern of temporal interpretation is deictic. The situations expressed linguistically are located relative to Speech Time: bounded events precede Speech Time, while unbounded events and states are located at Speech Time. The pragmatic principles that guide interpretation are the Bounded Event Constraint, the Simplicity Principle of Interpretation, and the Temporal Schema Principle. Lexical and adverbial information can determine a temporal interpretation that departs from the default.

Aspectual information of viewpoint and situation type is the key to the interpretation of temporal location. Aspectual viewpoints explicitly code whether a situation is bounded or unbounded. Zero-marked clauses, which are common, convey situation type and are interpreted by the Temporal Schema Principle together with the other principles. Temporal interpretation is not limited to the default patterns, of course. Information in the context may override the default, providing the flexibility required.

Three times are needed to account for temporal interpretation in Mandarin. Deixis has Speech Time as the main orientation point: the time of the situation expressed - Situation Time - is simultaneous with, before, or after Speech Time. There are grammatical forms that code the relation between a designated perspective time, or Reference Time, and Situation Time. These forms include the aspectual viewpoint morphemes le and -guo, and adverbials such as yijing ('already') and cai ('only then'). Relation to Speech Time is not coded linguistically, but is conveyed by context. We thus show that the Reichenbach approach to temporal interpretation applies to Mandarin.

Two other patterns of temporal interpretation are also found: narrative dynamism and static description. They appear in text passages that realize the discourse modes of

narrative and description. In narrative, time is dynamic and situations are related to each other rather than to Speech Time. Bounded events advance narrative time. In description, time is static and situations are related to a time already established. The deictic temporal pattern holds for the other discourse modes, Report, Information, and Argument. Text passages realize different discourse modes according to the type of aspectual entities that they introduce, and their principle of text progression.

The resources of tensed and tenseless languages differ; but this inquiry suggests a basic similarity in the interpretations and the principles that underlie them.

Footnotes

1. The ideas that we develop in this article were first presented in Smith 2000, and Smith and Erbaugh 2001. We thank Dr. Qing Wu and Ms. Hsi-Yao Su for assistance in preparing the texts that were used in this study. We also wish to thank the audiences who have heard one or both of us talk about the material, including the annual meeting of the Society for Text and Discourse, Lyons, France, in July 2000; the conference, Linguistics in the Next Decade, Academia Sinica, Taipei, Taiwan, in August 2000; the Third Texas Workshop on Text Structure in October 2000; and the First International Conference on Modern Chinese Grammar for the New Millennium, Hong Kong, in March 2001. We also thank two anonymous reviewers for their comments.

2. Deictic terms such as 'later' or 'here' can only be interpreted with reference to a specified time or place.

3. The simple verb form conveys the perfective viewpoint in English. For statives, the perfective viewpoint focuses the entire temporal schema of the state, which does not include endpoints; see Smith (1991/7) for discussion. Thus the interpretation of sentences like Tom feeds the cat is consistent with other statives in English. The shift to a stative situation type arises by coercion, triggered by the Bounded Event Constraint.

There are exceptions, e.g. sports-announcer reports and stage directions (Now Jones throws to third base), literary commentary (Here the author creates an interesting metaphor). In these cases time is telescoped. Note that performatives (I pronounce you husband and wife) are not exceptions: a performative is just that, a performance rather than a report (Austin 1961).

Present tense narratives have another interpretation: they express events that are related to each other, rather than to the moment of speech. See §3 for discussion of the temporal pattern of narrative.

4. The present tense doesn't always express a time in the present, nor does the past tense always express past time. This well-known fact is not relevant to the discussion here.

5. We assume five main situation types (Smith 1991/7). The classification is based on Vendler (1957) with one addition, the Semelfactive. States: know the answer, love Jean, be expensive. Events: Activity - atelic, durative: sing, walk; Semelfactive - atelic, instantaneous: cough, flap a wing; Accomplishment - telic, durative: build a house, walk to school; Achievement - telic, instantaneous: win the race, reach the top.

6. The Neutral viewpoint is a default with a positive semantic value. It arises in aspectual systems which allow sentences without an overt viewpoint morpheme. Empirically, the interpretation of zero-marked, aspectually vague sentences can be shown to be neither perfective nor imperfective. Such sentences are more flexible than sentences of either viewpoint, in that they allow both open and closed readings. See Smith (1991/7) for discussion. The range of meanings that is found for zero-marked sentences, and the theory-internal requirement of visibility, suggest that they have a viewpoint that is open but not unlimited.

7. In Reichenbach's (1947) system, tense conveys information about three times, Speech Time (SpT), Reference Time (RT), and Event Time (our Situation Time); and the relations between them. The semantic meaning of a tense gives the relations between the times. The approach has been modified and formalized for English in the framework of Discourse Representation Theory, or DR Theory (Smith 1991/7, 2003; Kamp & Reyle (1993).

8. For Klein and his colleagues, (1994, 2000), every sentence introduces a topic Time, the time about which the assertion of a sentence is made. The notions of Topic Time and Reference time as adduced here, and in Smith (1991/7) are quite similar. The theory of Kamp and Reyle (1993), although based on Reichenbach (1947), takes a slightly different approach.

9. The two have the same truth conditions, yet they differ in conceptual meaning. The notion of Reference Time explains the difference. Sentences with the past tense are set squarely in the Past, e.g. Leigh arrived. Reference Time and Situation Time are both Past. But present perfect sentences take the perspective of the Present: e.g. in Leigh has arrived, Reference Time is Present and Situation Time is Past. In some sentences three times are needed to state truth-conditional meaning, e.g. the past perfect Leigh had already arrived. The perfect construction has both temporal and aspectual meanings; aspectually perfects are stative.

10. For simplicity, we present constructed examples without temporal adverbs. Under certain circumstances, sentences with -guo have many temporal adverbs, as noted in Smith (1991/7). In the sentence below, mentioned by a reviewer, the past adverb zuotian ('yesterday') specifies SitT; here prior to RT = SpT.

Zhangsan zuotian daguo majiang.
Zhangsan yesterday da GUO mahjong.

The interpretation is similar to that of a present perfect sentence in English, although English does not allow a past adverb in such contexts.

11. We have checked these examples with several other native speakers and find considerable variation. Some speakers accept the three-time reading, especially in the presence of jiu ('just then, already'); others do not.

12. The editorials we used average about 700 characters each, the articles about 2,000 characters each. The six articles have a total of 7,640 characters, 176 sentences, in 699 clauses.

We coded every clause for situation type (event, state, generalizing-habitual), explicit aspectual viewpoint or RVC, temporal adverbial or other temporal form, modal, and special lexical verb factors, whether within the scope of a preceding temporal adverbial.

We also looked at other sources less intensively. For narrative, we examined five short stories and one novel. For non-fiction we examined two additional editorials from the Ming Bao Daily News, museum catalogs and travel guides, a book on Hakka culture, and a book of essays on Shanghai life. See sources of text examples below for more precise information.

13. Standard orthography for Hanyu Pinyin romanization prints le as a suffix immediately following the verb, without a hyphen. The exception is when le appears sentence-final, where it is printed as a separate morpheme, after a space (as the homophonous le mood particle also is).

We do not consider prepositional uses of -zhe to be aspect markers (e.g. yanzhe 'following along', bianzhe 'edging').

14. There are many studies of verbal le and -guo, too many to cite here. In addition to the traditional accounts, recent work includes Huang (1987), Shi (1990), Mangione and Li (1993), Yeh (1996), Klein et al. (2000). Lin (2003) gives a more complete list, though

still partial. Wu (2003) discusses many traditional and current accounts of the aspectual morphemes.

15. Perfective le appears with state verb constellations in ingressives and inchoative clauses. Ingressives focus on the initial endpoint of an event; inchoatives focus on the coming about of a state. They are derived events, arising through a regular process of coercion. There are examples with le in which a situation can be taken as continuing, as Lin (2003) points out. The following is one of Lin's examples:

Ta yangle yi zhi tuji.
He raise LE one CL wild chicken.
He is raising a wild chicken.

We analyze the continuing reading as the result of the ingressive: bounded le focuses the beginning of the Activity event. After the beginning, the event continues indefinitely. Note that our account differs from Lin (2003), in that we allow le clauses to express telic events that are not necessarily complete. That is, the bounds need not coincide with the natural final endpoint.

Our account is similar to the characterization of Klein et al. (2000), and of Mangione and Li: '...le marks a specific event time, which is ordered before and closely related to the sentence's reference time, while -guo provides an existential quantification over times earlier than the clause's reference time' (1993:68). Thus events occur just before the Topic Time indicated by -le'. This is directly relevant to narrative: as narrative time advances, RT advances to 'just after' a bounded event; see §3 below.

Lin (2003), considering le clauses in both dependent and independent contexts, proposes a relative anteriority parameter for le. In addition le may express assertion, as Klein et al. (2000) argue.

16. This is only a partial characterization of -guo: there is a great deal more to say. For instance, Klein et al. (2000) argue that the time distinguished by -guo is a time at which the 'result' of a situation is already past, whereas the English perfect distinguishes a time at which the result may still obtain.

17. We thank Bernhard Schwarz for useful discussion of the ideas formalized here, and for his help with the actual formalization.

18. There are several contexts in which le is obligatory if one wishes to convey the meaning of boundedness. For instance, a single syllable verb without a resultative complement conveys an ongoing situation without le.

- a. Wo chi vs. wo chi le.
I eat vs. I eat LE.
I'm eating vs. I ate.
- b. Wo pao vs. Wo pao le.
I run vs. I run LE.
I'm running vs. I've run.

19. Yang finds that a Resultative Complement strongly favors inclusion of le in foregrounded clauses, while a directional complement strongly favors omitting it. Single syllable verbs and main verbs without a verb complement are much more likely to include a le. In sequences of events, le is often omitted in the first clause, but included in the last. Telic verbs strongly favor inclusion, atelic verbs typically omit le. Non-native speakers, in contrast, are often insensitive to the importance of RVC's and overly attentive to adverbs and le (2002:247).

20. In Mandarin, futurity is typically modality, Hu et al. (2001) comment. This is true of many languages, c.f. Stassen (1997).

21. There are various studies of the incidence of aspect morphemes in texts. In a recent study of the corpus of Mandarin texts of the Academia Sinica, Wu (2003) found more aspect morphemes in Report and Fiction texts than in texts of Commentary and other genres. A rhetorical comparison of Chinese and English newspapers in Beijing and Hong Kong also finds extensive variation (Scollon, Scollon and Kirkpatrick 1994).

Christensen (1994) found aspect morphemes in 36% of the intonation units, which generally correspond to clauses, in written Chinese narrations of Chafe's 'Pear Stories' experimental film. Erbaugh (1990) examined spoken Mandarin narratives based on the 'Pear Stories'; in the most representative spoken narrative, 26% of intonation units contain aspect morphemes.

22. The Discourse Modes are proposed for written texts. They do not include conversation, procedural texts, and some other types.

23. In addition to bounded events in sequence, the default interpretation for narrative, there are other possibilities, not considered here. Events may be overlapping or simultaneous, there may be a change in level of detail, situations may be notionally rather than temporally related. Recognition of these different temporal and atemporal relations is pragmatically based.

24. Occasionally telic verb constellations appear in a descriptive passage. These have an atelic value, due to a regular process of coercion. Durative adverbials trigger a shift to an atelic situation, e.g. She wrote a letter for an hour. The durative adverbial may be tacit. See Smith (2003) for discussion.

Sources of Text Examples

Examples published in bilingual English-Chinese editions list the English title after a slash instead of in parentheses. The Ming Bao publishes an English translation of each day's Chinese editorial on the following day.

(9) (26) From a novel: Zhou Tianlai (1997). Tingzi Jian Saosao (Sister Next Door). Hefei: Anhui wenyi chubanshe. 50, 13.

(14),(16), (24) Magazine article: Chen Lirong (2000). Feng bao chuixi Zhongguan Cun (Stormy personnel conflicts rock Beijing's Silicon Valley). Qianshao Yuekan (Frontline Monthly). February. 48 - 49.

(15i), (22i) Editorial: Anonymous (2000). Gang fu minjian yao zai ding gong'an qiyue / The Hong Kong government must renegotiate its regulations for public order. Ming Bao (Ming Pao Daily News). 9, 10 October.

(15ii) Editorial: Anonymous (2001). Guotai jishi weixie bagong bu de ren xin / Cathay Pacific pilots have alienated the public. Ming Bao (Ming Pao Daily News). 29, 30 June.

(15 iii), (20), (28) Editorial: Anonymous (1999a). Gang fu xuanjin qu Xiyatu baoluan jiaoxun / Government should learn lesson from Seattle. Ming Bao (Ming Pao Daily News). 12, 13 December.

- (18i), (22iii), (23ii) Magazine article: Li Oufan [Leo Lee] (2000). Xianggang weihe zai chu bu liao da xuewen zhe? (Why can't Hong Kong produce great scholars again?). Ming Bao Yuekan (Ming Pao Monthly). August. 21 - 22.
- (18ii) Book: Lin Jiashu (1995). Tulou yu Zhongguo chuantong wenhua (Hakka houses and Traditional Chinese Culture). Shanghai: Shanghai renmin chubanshe. 92
- (19ii) Essay: Wang Weiming (1996). 1990 zoujin xin kongjian ('Entering a new space in 1990') in Yuwang de Chengshi (City of Longing). Shanghai: Wenhui chubanshe. 33.
- (21i), (21ii), (25) Magazine article: Wang Ruizhi (2000). Shenzhen er nai cun qing se youhuo (Love and sex temptations of Shenzhen's 'Village of Concubines'). Yazhou Zhoukan (Asiaweek). 28 August - 3 September. 24-25.
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2. Deictic terms such as ‘later’ or ‘here’ can only be interpreted with reference to a specified time or place.