Acquiring Temporal Meanings Without Tense Morphology: The Case of L2 Mandarin Chinese

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<ABSTRACT>

This article reports on an experimental study addressing the second language acquisition of Mandarin temporality. Mandarin Chinese does not mark past, present, or future with dedicated morphemes; the native English of the learners does. It was hypothesized that, in their comprehension, learners would utilize the deictic pattern of expressing temporality, which postulates that bounded events tend to be interpreted as past and unbounded events as present. Twenty-eight bilingual native speakers, 25 intermediate learners, and 23 advanced learners of Mandarin with English as their native language took three different interpretation tests. Learners' temporal interpretation choices were highly accurate even at intermediate levels of proficiency, suggesting that obeying the deictic pattern in second language comprehension is not hard. Pedagogical implications of these findings are discussed.

<END ABSTRACT>

Keywords: Mandarin Chinese; deictic pattern; viewpoint aspect; lexical aspect; temporal interpretation; temporal adverbials

Acquiring form–meaning mappings is at the core of second language acquisition (L2A). This is true of lexical items and their meanings (e.g., *chair* and 'a piece of furniture used for sitting') as well as of functional morphological affixes and the grammatical meanings they capture (e.g., *-s* and 'plural noun'; *-ed* and 'past state or event'). While learning lexical items largely depends on the frequency of occurrence of the word (Laufer & Nation, 1995), the acquisition of grammatical form–meaning pairs is affected by many other factors. Understanding these factors and their impact allows us to answer a fundamental research question: Which of the form–meaning mappings of functional morphology are easier to acquire and process than others?[1] A broad and common sense understanding of difficulty of acquisition is employed here, assuming that an easy property is one that is acquired successfully at earlier stages of development, as compared to a more difficult property. The practical purpose of identifying easy and hard properties is to aid language teachers: Hard properties should receive more attention and time in a language classroom while easy properties should come for free, as it were (Slabakova, 2008).

Goldschneider and DeKeyser (2001) propose perceptual salience, semantic complexity, morphophonological regularity, syntactic category, and frequency as factors that are crucial in

making a form–meaning mapping difficult. Although all these factors work in concert, what remains unclear is whether one or the other is more important. DeKeyser (2005) puts "transparency of form–meaning relationships" (p. 3) at the heart of linguistic difficulty. In principle, the mapping between functional morphology and grammatical meanings can range over various permutations of one to many, from most to least transparent: one form corresponding to one meaning, one form reflecting multiple meanings, multiple forms reflecting the same meaning, and, finally, a many-to-many relationship. If a universal grammatical meaning (e.g., plural, past state or event, definiteness, ongoing action, politeness) is expressed by one configuration in the native language (L1) and by another configuration in the second language (L2), this learning situation would constitute a morphosyntax–semantics mismatch and would arguably present additional difficulty in L2A (Slabakova, 2009). Although learners have access to the whole arsenal of universal conceptual meanings (Jackendoff, 2002), they have to learn how to interpret and express the meaning in the new language.

This learning situation could be significantly complicated if a universal grammatical meaning is not expressed by any overt morphosyntactic forms. As a systematic difference between languages, various aspects of meaning can be *lexically* or *contextually* expressed in some languages while they are morphologically marked in other languages. Number and evidentiality have been discussed in this respect (e.g., Chierchia, 1998, for number; Lazard,

2001, for evidentiality). This form–meaning mapping could be described as even harder to master than a many-to-many relationship, since lexical items have their own meanings in addition to signaling grammatical meaning, and tracking discourse context plausibly relies on heightened attention and memory resources.

In this respect, the property investigated in this article, comprehending direct and indirect cues in order to build temporal interpretations of L2 Mandarin Chinese sentences and texts, should be very hard to learn indeed. Temporality is a fundamental category of human cognition that refers to the expression of temporal circumstances and properties of events. Every human language presents a full array of devices (adverbial, verbal, or grammatical) to signal the temporal properties of a situation, that is, broadly speaking, to refer to its location in time. What is expressed by grammatical tense or aspect in one language can be expressed by lexical means in another or be left to pragmatic inference. As will be described in more detail later, comprehension of Mandarin past, present, and future depends on lexical items such as time adverbials (e.g., *yesterday*, *next week*, *some time ago*), viewpoint aspect morphemes (*le* 'termination or completion,' *zài* 'ongoing state or event,' etc.), and discourse context tracking. Since English has dedicated tense morphemes, comprehension of temporality does not crucially depend on aspectual, lexical, and adverbial means. Therefore, the English–Mandarin temporality

contrast can be described as a form–meaning mismatch, leading to anticipation of acquisition challenges.

On the other hand, Dietrich, Klein, and Noyau (1995), arguing against the "inflectional bias" in studies of L2 temporality, suggest that learners who do not produce temporal inflectional morphology (i.e., tense) can nevertheless "tell quite complex personal narratives, with a dense web of temporal relations" (p. 18). The authors caution that merely analyzing the growth of learners' inflectional morphology in production may be missing the important aspects of tense and aspect marking development. Temporal adverbials, for example, are suggested to be more basic to the expression of temporality than is inflectional morphology, since not all languages have morphosyntactic means of signaling tense but all languages employ temporal adverbials. Furthermore, discourse temporal organization may include a universal principle such as the following: In a narrative, an utterance is usually temporally linked to the preceding and the following ones. Finally, as expounded on later on, overt functional morphology marking aspect may lead to a default interpretation of tense: Complete actions are normally interpreted as past; ongoing actions are normally interpreted as nonpast (Smith & Erbaugh, 2005). All these common ways of signaling temporal relations have been proposed to be necessary in Mandarin Chinese. Hence, learners of Chinese can tap into their knowledge of universal linguistic structure, or into their native language knowledge, or both, when faced with comprehending

utterances without morphological marking of temporality. If this is indeed the case, no big difficulty in the acquisition of L2 Mandarin temporality is predicted.

The article explores these two polar opposite predictions about the difficulty of acquiring temporal interpretation in Mandarin. It does so by presenting an experimental study on the comprehension of Chinese temporal structure by bilingual native speakers of Mandarin Chinese and English. An advantage of the research design is that all participants are (at least) bilingual in Mandarin Chinese and English: If differences emerge in their treatment of temporality, they are not due to the effects of bilingualism but to their relative proficiency in Mandarin Chinese (native, advanced, intermediate). The experimental design involves processing Chinese sentences for meaning and choosing from various interpretations that differ only in their value of temporality—past, present or future. Test sentences are monoclausal and employ basic and frequent words in order not to present lexical difficulties to the speakers. The effect of lexical aspect, viewpoint aspect, and temporal adverbials on temporal interpretation is scrutinized. To anticipate the findings, I argue that, although different in some respects from natives, learners of Chinese are highly accurate in interpreting the temporal values of sentences. Thus the results suggest that a universal temporality calculation mechanism is at play in the grammar of the learners, and the acquisition of temporality in L2 Chinese, investigated in comprehension, does not present a huge difficulty.

<A>HOW DOES MANDARIN CHINESE SIGNAL PAST AND PRESENT?

A critical distinction should be made right from the start: the differentiation between cognitive grammatical categories and their linguistic expressions, or realizations. For example, the grammatical meaning 'plural' (i.e., more than one) can be expressed by *-s* in English, by reduplication in Indonesian and Malay, or can be left unexpressed morphologically, as in Acehnese. Following Comrie (1985), we will think of *location in time* as the grammatical meaning and *tense* as its expression. "The idea of locating situations in time is a purely conceptual notion, and is as such potentially independent of the range of distinctions made in any particular language" (Comrie, 1985, p. 7). Location in time can be expressed linguistically in many different ways ranging from purely lexical to grammatical. In establishing location in time, some languages give more weight to the lexicon, others to the grammar. To evade terminological confusion, in this article we shall use *temporality* to refer to location in time and *tense* as its morphological expression.[2]

It is sometimes hard to separate the function of tense from aspect, and many languages (Romance, Germanic) have conflated inflectional categories expressing both types of meanings. For example, English *-ed* is argued to be a perfective and a past tense marker at the same time; Spanish imperfect is a past and imperfective form (Smith, 1991, 1997). Still, the two

grammatical meanings are distinct. Tense relates a given event or state to speech time: Every state or event described by a finite clause can be evaluated as happening before, during, or after the moment of speech (Comrie, 1985; Reichenbach, 1947). On the other hand, aspect is concerned with the "internal temporal constituency of a situation" (Comrie, 1976, p. 5).

Within the category of aspect, lexical aspect (often referred to as *Aktionsart*) and viewpoint (grammatical) aspect should be distinguished. The former presents the event or state encoded by the verb phrase as potentially bounded (telic) or unbounded (atelic), see examples in (1). Four lexical aspectual classes (i.e., situation types) are generally distinguished, as proposed by Vendler (1967):

(1) a. to be sick (state, atelic)

b. to build houses (for a living) (activity, atelic)

c. to eat a slice of cake (accomplishment, telic)

d. to notice the change (achievement, telic)

Viewpoint aspect (Smith, 1991, 1997) reflects how a speaker conceives of an action or a state: When a speaker views the situation as a complete (bounded) whole without distinguished separate phases, she can employ perfective viewpoint aspect as in (2a). If a speaker focuses on the internal structure of the situation, she can choose imperfective aspect as in (2b). Inchoative, iterative, habitual, durative, etc. are imperfective aspectual meanings.

(2) a. She ate a slice of cake this morning. (perfective accomplishment)

b. She was eating a slice of cake when I saw her. (imperfective accomplishment)

Lexical and viewpoint aspect are taken into account in calculating temporality, since aspectual morphemes carry temporal information in addition to the aspectual information. In Mandarin Chinese, they can be used to signal meanings reserved for tense morphemes in other languages. Here, the focus is on whether learners comprehend these temporal cues.

It is well documented that Mandarin Chinese does not have a dedicated inflection to mark past, present, or future (Smith & Erbaugh, 2005). In the following examples (3a, b), note that the form of the verb is exactly the same in both a past and a present sentence (Sybesma, 2007):

(3) a. Zhāngsān zhù zài zhèr.

Zhang San live at here

'Zhang San lives here.'

b. Zhāngsān 1989 nián zhù zài zhèr.

Zhang San 1989 year live at here

'Zhang San lived here in 1989.'

Mandarin marks viewpoint aspect by separate morphemes, which are well studied (Klein, Li, & Hendriks, 2000; Li & Thompson, 1981). The literature focuses mainly on four of these: *zhe* and *zài* characterize the situation as incomplete, ongoing, or durative, whereas *le* and *guò* denote a completed or terminated event, *guò* having the additional meaning of a perfect tense (along the lines of *I have read this book*). The Resultative Verb Complex (RVC) is another construction marking aspectual completion (boundedness).

Smith and Erbaugh (2005) and Lin (2003, 2006) have argued that the traditional explanation of temporal information being conveyed in Chinese by adverbials and discourse context is only partially correct. Along the lines of Bohnemeyer and Swift's (2004) analysis of default aspect, they propose that the main pattern of marking Mandarin temporality is the so-called *deictic pattern*: Aspectual lexical class and viewpoint aspect convey information that allows speakers to locate the situation in time, in the absence of explicit tense marking. This is a universal pattern (underlying production as well as comprehension), which crucially depends on the concept of *boundedness*. Boundedness is an aspectual notion referring to a property of situations expressed in whole sentences. Bounded situations are temporally closed by implicit or explicit bounds; unbounded situations are ongoing, temporally open. Boundedness depends on both lexical aspectual class and viewpoint aspect. The deictic pattern is presented in (4), as formulated by Smith and Erbaugh (2005, p. 715).

(4) a. Unbounded situations are located in the present.

b. Bounded events are located in the past.

The pattern places activities and states (unbounded eventualities) in the present; accomplishments and achievements (bounded eventualities) are interpreted as past. The viewpoint aspectual morphemes also constrain temporal meanings according to the same schema: A completed situation (perfective viewpoint) implies past; an ongoing or habitual action (imperfective viewpoint) implies nonpast. Finally, lexical and adverbial information can also anchor states or events in time. However, lexical means have an additional function: They can lead to nondefault interpretations; that is, they can override the default deictic pattern.

Two pragmatic principles underlie the deictic pattern: the bounded event constraint and the simplicity principle. The former postulates that bounded events are not located in the present (Giorgi & Pianesi, 1997; Lyons, 1977; Smith, 2003), since what is going on at the moment of speech cannot be completed at the same time. The simplicity principle of interpretation postulates that hearers choose the interpretation that requires the least additional information. Furthermore, "[w]hen faced with information that does not fully determine an interpretation, people choose the simplest interpretation to resolve it" (Smith & Erbaugh, 2005, p. 716). The latter principle is akin to Grice's (1975) second maxim of quantity (Don't make your contribution more informative than is required) and Horn's (1984) R-principle (Say no more than

you must). The bounded event constraint and the simplicity principle are conversational conventions that depend on context observation and cooperativeness but have semantic consequences. Axiomatically, they are considered to be universal.

If lexical aspect and viewpoint aspect contribute to the marking of temporality, we should examine how this aspectual information is expressed in Mandarin Chinese. Following Vendler's (1967) categorization of lexical classes (exhibited by verbs but using verbal phrases and clauses as the units of classification, see examples in [1]), Smith (1991, 1997) concludes that the four basic situation types proposed by Vendler (1967)—namely states, activities, accomplishments, and achievements—are identifiable in Chinese. Smith proposes a fifth lexical class, semelfactives, but its existence as a separate lexical class is questioned (Rothstein, 2004), and it is not employed in this experimental study. States (situations without potential endpoints) are usually realized in Chinese as adjectival predicates (*shīwàng* 'disappointed'), prepositional predicates (*zài hédōng* 'to the east of the river'), psychological state verbs such as zhīdào 'know' and *xǐhuān* 'like,' and some other constructions.

(5) Lǐsì hěn jǔsàng. (state)

Lisi very depressed

'Lisi is very depressed.'

Activities as in (1b) are atelic eventualities without explicit final endpoint, they can be expressed by dynamic verbs without object or with nonquantified or generic objects: (*sànbù* 'stroll,' *jiāoshū* 'teach,' *tīng yīnyuè* 'listen to music,' *chōuyān* 'smoke cigarettes').

(6) Wǒ chī běijīng kǎoyā (activity)

I eat Beijing roast duck

'I eat Beijing roast duck/I am eating Beijing roast duck.'

Accomplishments are eventualities with a potential endpoint, or telic eventualities as in (1c).[3] In English, they are expressed by dynamic verbs and quantified objects: *to eat a slice of cake, to drink two cups of coffee*. When presented in the perfective viewpoint (the past simple tense), these events are interpreted as complete: *She ate a slice of cake*. However, as argued by Soh and Kuo (2005), Chinese differs from English with regard to whether an accomplishment situation has reached its natural endpoint when presented in the perfective viewpoint. They attribute the differences between Chinese and English to differences in the boundedness feature on Chinese and English noun phrases. For nouns, boundedness is a property related to whether the entity has defined extent or quantity (Tenny, 1994; Verkuyl, 1993). In English, definite or demonstrative NPs (e.g., *the/this/that cup*) and NPs quantified with numerals (e.g., *three cups*) are considered [+ bounded]. In Chinese, however, definiteness is not marked, demonstrative NPs have the option of being interpreted as either bounded or unbounded, while quantified NPs must

be bounded, just as in English. For this reason, our experimental items contained unambiguous accomplishments: The verbs had telicity marked on them through the Resultative Verb Construction (RVC) and the objects were quantified, as in (7).

(7) Lǐsì chī-wán sān wǎn fàn (accomplishment)

Lisi eat-finish three CL rice

'Lisi ate three bowls of rice.'

To recapitulate, both Lin (2003, 2006) and Smith and Erbaugh (2005) point out that, in isolation, sentences without time adverbials or viewpoint aspect markers describing atelic situations tend to get a present tense interpretation as in (5) and (6), but those describing telic situations get past time reference as in (7).

Viewpoint aspect provides a temporal perspective on events: It locates events relative to a point-of-view (reference) time. It is all about the linguistic representation of events, not about the events' inherent properties, hence its name. The traditional view (Comrie, 1976; Smith 1991, 1997) has it that the perfective viewpoint presents eventualities from the outside while the imperfective viewpoint presents them from the inside. Thus, perfective-marked events are either complete or temporally bounded, while imperfective-marked eventualities are ongoing or open-ended habitual events. Mandarin has a range of aspectual particles that mark location in time, and corpus studies indicate that such markers are widely used (Xiao & McEnery, 2004).

Example (8) (from Smith, 1991, p. 349) illustrates that sentences marked with the perfective particle *le* often describe completed events in the past. However, as (9) (Smith, 1991, p. 349) illustrates, *le* merely requires boundedness of the event, not necessarily completion, which is conveyed by the resultative suffix -*wán* 'finish' (see also Soh & Kuo, 2005). In (9a), even though *le* is present and the object is quantified, the clause can be felicitously conjoined with a negating clause. In (9b), the verb *xiě* and the resultative suffix (or light verb) *wán* combine to make a Resultative Verb Complex (RVC) (Tai, 1984), invariably interpreted as telic, as the ungrammaticality of the negation illustrates.

(8) Wǒ shuāiduàn-le tuǐ (accomplishment)

I break ASP leg

'I broke my leg (it's still in a cast).'

(9) a. Wǒ zuótiān xiě-le yī fēng xìn, kěshì méi xiě-wán.

I yesterday write-ASP one-CL letter, but not write-finish

'I wrote a letter yesterday, but did not finish it.' (infelicitous in English)

b. *Wǒ zuótiān xiě-wán-le yī fēng xìn, kěshì méi xiě-wán.

I yesterday write-finish-ASP one-CL letter, but not write-finish

'I finished writing a letter yesterday, but I didn't finish it.'

The experiential marker *guò* as in (10) (from Smith, 1991, p. 349) also imposes a past interpretation regardless of the type of eventuality involved (Lin, 2006, p. 10). Note that (10a) is an example of an activity while (10b) employs a stative predicate; however, both interpretations are past.

(10) a. Lǐsì hē guò jiǔ (activity)

Lisi drink ASP wine

'Lisi drank wine.'

b. Wǒ xiāngxìn guò nǐ (state)

I believe ASP you

'I believed you.'

c. Lǐsì diēduàn guò zuǒ tuǐ (accomplishment)

Lisi fall-broken ASP left leg

'Lisi has broken his left leg before.'

Furthermore, as (10c) (from Lin, 2006, p. 10) illustrates, when used with accomplishments, *guò* imparts the additional meaning of a result state. As Lin (2006) explains, this result state may not hold at speech time; in this example, the broken leg must be cured before speech time. This property of *guò* is known as the *discontinuity effect* in the literature. Note that the other perfective marker *le* and the English present perfect tense lack this

discontinuity interpretation. For this article, however, only the past (resultant state) interpretation of *guò*-marked eventualities is of consequence.

The two imperfective aspect markers in Mandarin Chinese, *zài* and *zhe*, focus on the internal development of the situation and tend to provide present time interpretation. *Zài* is a progressive marker and its semantics is very close to the English progressive tense marker, see (11) (from Lin, 2006, p. 16). It appears with activities and accomplishments.

(11) Lǐsì zài xǐzǎo (accomplishment)

Lisi Prog take-bath

'Lisi is taking a bath.'

On the other hand, the durative marker *zhe* only occurs with atelic eventualities.

(12) a. Tā liú zhe yī tóu cháng fā (activity)

he wear ASP one-head long hair

'He wears his hair long.'

b. *Tā xiě zhe liǎng piān wénzhāng (accomplishment)

he write ASP two-Cl articles

'He is/was writing two articles.'

According to Lin (2006, p. 18), the interval of having long hair in (12a) should overlap with the speech time. Finally, the auxiliary verb *huì*, with a modal meaning similar to 'can,' or 'know how,' can alternatively indicate futurity (Li & Thompson, 1981).

Let us summarize informally the aspectual and temporal information conveyed by the overt viewpoint morphemes, and by the aspectual lexical classes in the absence of viewpoint markers (what Smith, 1991, 1997 calls the neutral viewpoint).

(13) The aspectual morphemes of Mandarin convey the following temporal information (in the absence of adverbials):

le: bounded event, terminated but not necessarily completed, tends to be interpreted as past;

RVC: bounded event, complete, tends to be interpreted as past;

guò: bounded prior situation, tends to be interpreted as past, or resultant state;

zài: unbounded event in progress, tends to be interpreted as present;

zhe: unbounded situation, tends to be interpreted as present;

no overt viewpoint: telic events tend to be interpreted as past; atelic eventualities tend to be interpreted as present.

However, temporal adverbials, including the future auxiliary *huì*, if in conflict with the aspectual information, take precedence in interpretation.

<A>ACQUISITION OF TEMPORALITY MARKING

To master the temporal system, Mandarin-speaking children need to learn not only how to use formal temporal devices (the viewpoint aspectual particles, for example) but also how to convey implicit references to past or future events. Erbaugh (1978, 1992) suggests that learning less is actually more difficult. The lack of dedicated tense morphemes in Mandarin forces the child to identify other markers of temporality, which come from various areas of the grammar: adverbials in the lexicon, grammatical morphemes reflecting other grammatical meanings, and pragmatic principles. Huang's (2003) study describes the use of different linguistic devices for temporal reference by two Mandarin-learning children aged 3;3 and 3;2, by the mothers addressing the children and in adult conversations between the mothers and their friends.[4] The hypothesis that properties encoded by a morpheme are easier to learn, compared to properties fixed by discourse context, is completely supported. Furthermore, the children's abilities to use discourse–pragmatic resources were still rather limited. They relied on situational context (the here-and-now) and not so much on discourse context (previously mentioned temporal adverbials).

To the best of my knowledge, there are very few experimental studies investigating the L2A of Chinese temporality by native speakers of English. Yang (2002) analyzed the elicited

production of 20 native speakers of Chinese, collected by Erbaugh (1990) in Taiwan, and the equivalent production of 21 Anglophone adult learners of Chinese, collected by Polio (1995), also in Taiwan. The Chinese learners displayed all the means of conveying temporality that the natives demonstrated. However, there was a marked preference for implicit temporal cues at the lower levels of proficiency. Only the advanced learners matched the native preference for explicit means, especially adverbials, in the foregrounded sentences. These findings largely concur with Huang's (2003) findings about Chinese children before they become fully adult-like.

Fan (2005) looked at the acquisition of Chinese by English native speakers in their fourth semester of university study. The results of her temporal comprehension task are relevant for the current discussion. In that task, students had to read sentences and a short connected passage, where some verbal phrases were underlined. Learners were asked to indicate the time reference of the phrases: whether the action occurred in the past, present, or future. Accuracy was above 85% across the board, with the students being equally accurate when temporality was signaled by a viewpoint morpheme (*le*, *guò*, *zài*) and when it could be inferred from the lexical class of the predicate or from context.

In the opposite learning direction, it is well known that Chinese-native learners omit marking the past tense morphology in English. For example, Lardière's (2007) fossilized speaker Patty provided the *-ed* marker in around 34% of obligatory contexts, while Yang and Lyster's

(2010) instructed learners provided 55–63% past tense marking in oral (pretest) production and 65–73% in written production. Investigating interpretation, Gabriele and Maekawa (2008) offered evidence of successful comprehension of the English temporal contrasts by advanced levels of proficiency. Recently, Chan (2012) showed that in processing English sentences online, advanced learners were not sensitive to omitted past tense morphology (e.g. **Yesterday several large snakes escape-Ø from their cage at the zoo)* but they were sensitive to meaning clashes between adverbial and tense information (e.g., #*Tomorrow several large snakes escaped from their cage at the zoo.*). I return to these findings in the discussion section.

In sum, although studies on the L2 acquisition of Chinese viewpoint aspect are more common (e.g., Duff & Li, 2002; Li & Shirai, 2000), there is a dearth of rigorous studies investigating whether learners of Mandarin Chinese attribute the correct temporal interpretation to the sentences they encounter. The few existing studies suggest, however, that correct interpretation is not a problem for classroom learners even at intermediate levels of proficiency.

<A>THEORETICAL PREDICTIONS AND RESEARCH HYPOTHESES

It is considered to be difficult to learn a grammatical meaning when "transparency of form–meaning relationships" (DeKeyser, 2005, p. 3) is lacking. The expression of Chinese temporality is a classical case for such lack of transparency, since there is no dedicated

inflectional morphology and aspectual morphemes are doing double duty in that they also point to situation time. Adverbials, when they are available, establish the time frame of states or events, but learners have to pay special attention to them, as well as to the general discourse context, which requires heightened attention to discourse that is unnecessary in English. This is a classical one (meaning)-to-many (expressions) learning situation. Thus a prediction of this line of reasoning is that correct comprehension of Mandarin Chinese temporality will be difficult to acquire.

On the other hand, as already discussed, there exists a universal deictic pattern, whereby unbounded situations are located in the present and bounded events are located in the past. (Smith & Erbaugh, 2005). This deictic pattern would predict that telic lexical predicates and *le*- and *guò*-marked predicates will be given a past interpretation, in the absence of additional context or adverbials. It also predicts that atelic verbal phrases, *zhe*- and *zài*-marked predicates would be interpreted as present, again in the absence of additional pointers to an alternative location in time. Hence, in this particular case of one-to-many mappings, it is expected that the universal meaning-calculating mechanism will aid learners.

In addition, it was predicted that the universal deictic pattern would be available to learners in interpreting the time reference of narratives. When an explicit time adverbial is introduced in the beginning of a story, learners were expected to interpret the whole story in the

scope of those adverbial meanings. The discourse-monitoring behavior necessary for such interpretation is universal and can be transferred from the native language. However, discourse-monitoring is not so important for temporal orientation in English because temporality is marked morphologically through tense. Thus it was anticipated that this language skill would take time to develop fully.

Based on these theoretical predictions, the following explicit hypotheses were formulated:

H1. Native speakers of Chinese will obey the deictic principle and will choose the interpretations predicted by it.

H2. Learners of Chinese are expected to behave in one of two ways:

a) If learners' behavior closely follows that of bilingual native speakers, then such findings point to the operation of the universal deictic principle in second language comprehension.

b) If, on the other hand, learners diverge considerably from the native performance, such findings support the contention that one-meaning-to-many-expressions learning situations are challenging in second language acquisition (cf. DeKeyser, 2005).

<A>EXPERIMENTAL STUDY

<B>Participants

Seventy-six individuals (28 native speakers, 25 intermediate learners, and 23 advanced learners of Mandarin Chinese) took the written test and recorded their responses online. All participants were bilingual in Chinese and English, and some spoke other languages as well. No independent proficiency test was administered, due to the overall length of the experimental materials. An extensive background questionnaire provided information on length of study, courses finished or enrolled in, and self-reports in the four language skills. This information was used to assign learners to the two proficiency levels. Participants who reported taking up to four semesters of Chinese language classes in a U.S. university, and hence had been studying for less than 2 years, were considered intermediate learners. Participants who reported taking advanced Chinese classes (including and above fifth semester of Chinese), or spending extended periods of time (4.6 months on average) in China or Taiwan, were deemed to be advanced learners. Self-reports of proficiency in the four skills largely coincided with the two groupings. Furthermore, the fact that the temporal choices were presented in English necessitated that all participants, including the native Chinese speakers, be bilingual. In order to make sure the latter were not attritted Chinese speakers, they were recruited from mainland China, where most of them resided at the time of the testing.

<B>Procedure

Two written comprehension tasks, a written Chinese-into-English translation task and a background questionnaire, were administered to all participants using SurveyGizmo, an independent survey administering service. The tasks were available to the Mandarin-native and English-native participants on the internet. Invitations to participate were distributed in Chinese classes at two Midwestern universities, on discussion lists, and through personal connections. Participation was voluntary and not remunerated. The answers were anonymous. It took participants between 60 and 90 minutes to complete all three tasks.

<B>*Materials*

Since this is the first extensive and rigorous study of L2 Chinese temporal comprehension, the experimental tasks were of an exploratory nature. Three different tasks were created and piloted widely: a Temporal Interpretation Choice task, a Stories task, and a Translation Task. In the Temporal Interpretation Choice task, the goal was to ascertain the temporal interpretations of sentences in comprehension, without context and without adverbials. Testing whether learners obey the universal deictic principle is only possible in the absence of context, otherwise context would undo the effect of aspect on temporality.[5]

Another important decision with respect to the research design was to use English sentences as the interpretive options in the Temporal Interpretation Choice task and in the Stories task. This decision was determined by the following considerations. If the temporal interpretation

options were given in Chinese, the intermediate learners' comprehension could be impeded by the Chinese vocabulary and/or structure. The temporal choices had to be crystal clear to them.

Second, a bilingual test was possible, since it was intended from the outset to invite bilingual native speakers. The choice to present the interpretations in English opens other potential issues: For example, were the Chinese native speakers able to identify correctly the English temporal morphology in English, their second language? In order to minimize this issue, I used the simplest possible English sentences such as *Lisi drove to school* and *Lisi drives to school* (see example in Figure 1). Furthermore, the viewpoint aspect of the options matched the aspectual makeup of the Chinese test sentence (ongoing, complete, habitual perfect, etc.). In this way, speakers could choose a temporal interpretation (past, present, future) without the aspectual information of the sentence interfering in their choice. Finally, the overall accuracy of the Chinese native speakers on the Translation task was 98.2% (see results section), which suggests that they were quite capable of expressing past and present interpretations in English. In future research on this issue, tasks completely worded in Chinese will be used and the results will be compared to the present results.

Figure 1 presents a screen shot of a test sentence from the Temporal Interpretation Choice task. The Stories task followed the same format. The test sentences were presented in Chinese characters and pinyin. Participants had to choose from four available interpretations, as Figure 1

illustrates. The first two options comprised two complete and acceptable English sentences, one with a present and the other with a past temporal interpretation. Past and Present choices were counterbalanced across examples, the answer Both was always third, and the answer Neither was always fourth.

FIGURE 1

Screen Shot of a Test Sentence in the Temporal Interpretation Choice Test

In order to find out whether the Mandarin speakers were influenced in their temporal interpretation by the aspectual class of the predicate and by the grammatical viewpoint aspect, eight different conditions were created in the Temporal Interpretation Choice task, with three bare aspectual classes (states, activities, RVC accomplishments) and four viewpoint aspect morphemes (*le* 'bounded situation,' *zài* 'unbounded, ongoing situation,' *zhe* 'unbounded

situation,' and *guò* 'experiential perfect'), plus a combination of RVC and *le*. Predicates were taken from the basic classroom vocabulary and were deemed to be familiar even to beginners in Mandarin. Table 1 lists the conditions in that task with examples and the expected interpretation, according to the deictic principle.

TABLE 1

Conditions, Examples and Expected Interpretation of Test Sentences in the Temporal Interpretation Choice Task

Condition	N	Example	Expected Interpretation
A. Bare states	5	Zhāngsān fēicháng shīwàng Zhangsan very disappointed 'Zhangsan is very disappointed.'	Present
B. Bare activities	5	Wǒ chī běijīng kǎo-yā I eat Beijing roast duck 'I eat Beijing roast duck.'	Present
C. Resultative Verb Complex (RVC)	5	Lǐsì dǎ-pò yíge huāpíng Lisi break one CL vase	Past

accomplishments		‘Lisi broke a vase.’	
D. Viewpoint aspect *le*	5	Lǐsì chī-le wǎnfàn Lisi eat-Asp supper ‘Lisi ate supper.’	Past
E. RVC + viewpoint *le*	5	Zhāngsān kàn-wán-le diànyǐng Zhangsan watch-finish-Asp film ‘Zhangsan watched a film.’	Past
F. Viewpoint aspect *zai*	5	Lǐsì zài xǐ-zǎo Lisi Asp take-bath ‘Lisi is taking a bath.’	Present
G. Viewpoint aspect *zhe*	5	Lǐsì dǎ-zhe yì-bǎ hóng-sǎn Lisi hold-Asp one-CL red-umbrella ‘Lisi is holding a red umbrella.’	Present
H. Viewpoint aspect *guo*	5	Tā qù-guò xīn jiànshēnfáng He go-Asp new gym ‘He has been to the new gym.’	Past/Resultant state

In English, it is not uncommon to use an adverbial to establish the time of the narrated event in a connected story, and to interpret it as having scope over the whole time of the narrated

event. However, English also temporally marks each verbal form. In order to find out whether learners interpret remote adverbials as emanating their temporal value to a whole story, a Story Temporal Interpretation task was created. A narrative of at least five clauses was presented in Chinese. In the beginning of the story, an explicit adverbial such as *when I was a child* or *right now* established the time frame. Participants were asked to choose the interpretation of the last sentence, which was underlined, three clauses after the one with the adverbial. The interpretive options were very much as in the previous task, once more provided in English. Here are two example stories with a past (14) and an ongoing present interpretation (15). There were five past event and five present ongoing event stories.

(14) Shí nián qián wǒ háishì ge xuéshēng de shíhòu wǒ xuéxí zhōngwén, wǒde zhōngwén lǎoshí hěn hǎo. Měitiān dōu bùzhì gōngkè. Gōngkè hěn nán yīncǐ wǒ xué zhōngwén xué de hěn hǎo.

‘When I was a student ten years ago, I studied Chinese. My Chinese teachers were very good. We had an assignment every day. The assignments were hard. I learned Chinese very well.’

(15) Ānjiélìnà Qiúlì shì ge hǎo yǎnyuán. Wǒ zhèng zài kàn tā de xīn diànyǐng. Tā zài shèjī

. Tā zài duǒ yí ge rén. Tā zhèng cóng yí liè xíngshǐ de huǒchē shàng wǎng xià tiào.

'Angelina Jolie is a good actress. I am watching her new movie now. She is shooting. She is hiding from a man. She is jumping from a moving train.'

A final task offered the participants written Mandarin Chinese sentences and asked them to translate the sentences into English. Only the choice of morphological tense (but not viewpoint aspect) was considered in the scoring of this task, if the meaning of the sentence was more or less correct. The goal of the conditions in this task was to mix and match conflicting lexical and viewpoint aspect with temporal adverbials and see which one wins out in the temporality calculation. Table 2 presents the conditions, an example from each condition, and the intended interpretation according to the predictions of the deictic principle. In the case of condition A, accomplishments (telic eventualities in English) are combined with the ongoing morpheme *zài*. Condition B offers the opposite combination: an activity with terminating *le*. Condition C pairs an accomplishment, which on its own could be interpreted as bounded, hence past, with a future modal. Condition D combines an activity with a future modal and adverbial. States on their own are interpreted as present, but when combined with a past adverbial as in condition E, the adverbial should take precedence. Finally, condition F offered the most difficult combination of an activity with *zài* 'ongoing' viewpoint aspect and a past adverbial.

TABLE 2

Conditions, Examples, and Expected Interpretation of Test Sentences in the Translation Task.

Condition	N	Example	Expected Interpretation
A. Accomplishments + *zai* 'ongoing'	5	XiǎoGāo zài chī yíge yuèbǐng Xiaogao Prog eat one-CL mooncake 'Xiaogao is eating a mooncake.'	Present
B. Activities + *le* 'terminated action'	5	Wǒde bàba zuò-le hǎochīde chǎofàn my father cook-Asp delicious fried rice 'My father cooked delicious fried rice.'	Past
C. Accomplishments with future modal	5	Tā míngnián huì xiě sānběn xīnshū He next year will write three-Cl new book 'He will write three new books next year.'	Future
D. Activities with future adverbial and future modal	5	Lǐsì míngtiān huì tīng sānshǒu zhōngwén gē Lisi tomorrow will listen three-CL Chinese song 'Lisi will listen to three Chinese songs tomorrow.'	Future
E. States with past adverbial	5	Wǒ shàng ge xīngqī hěn máng I last-CL week very busy	Past

		‘I was very busy last week.’	
F. Activities with *zai* with past adverbial	5	Lǐsì zuótiān sì-diǎn zài děng gōngchē Lisi yesterday four-o’clock Asp wait-bus ‘Lisi was waiting for bus at four o’clock yesterday.’	Past

<A>RESULTS OF THE EXPERIMENTAL STUDY

<B>Method

Results will be presented in terms of accuracy first, and described statistically by Repeated Measures ANOVAs, followed by one-way ANOVAs for each condition. Next, temporal choices will be assessed qualitatively through graphs. In determining accuracy, actual choices made by the bilingual native speakers will be the comparison basis, not the deictic principle. In the conditions where the natives opted for two interpretations with more than 10% of the answers, both options were considered correct. Where native speakers chose all three options (to the exclusion of the Neither answer) with over 10% of the answers each, all three were deemed acceptable. Finally, chi-squared nonparametric tests will be used to compare learners’ and natives’ frequencies of temporal choice. The goal is to ascertain whether the interpretive choices of the speaker groups were independent of each other or related.

Nonsignificant *p* values in the chi-squared tests will be taken to point to essentially similar interpretive choices. For the chi-squared tests, the actual frequencies of temporal interpretations, not accuracy percentages, were entered in the calculations.

<B>Temporal Interpretation Choice Task

Since this task offered participants four temporal interpretations to choose from, the results are in the form of choices, labelled Past, Present, Both, and Neither for short. For example, in Condition B, the deictic principle predicts that bare activities will be interpreted as present. However, native speakers chose the Present interpretation 95 times (67.8%) and the option Both 38 times (27%), the latter not a negligible percentage. They also returned three Neither and two Past responses. Since the combined percentage choice for Present and Both is over 90% of all choices, it was assumed that the response Past (on its own) is not correct, but that Present and Both are correct responses.

ANOVA (RM) on the whole dataset using accuracy scores returned a significant Effect of Condition (F[7,511] = 2.647, p = .011, partial eta squared = .035, observed power = .9); a significant Effect of Group (F[2,73] = 3.76, p = .028, partial eta squared = .093, observed power = .670); and a nonsignificant interaction (F[14,511] = .844, p = .621, partial eta squared = .023, observed power = .547).[6] Table 3 offers mean accuracy and SDs for all conditions, as well as expected and actual interpretations. Multiple one-way ANOVAs were performed on the accuracy

means, looking for group effects, and the *F*, *p*, and eta squared values are also given in Table 3. As the *p*-values show, there is a significant Effect of Group only in conditions C (bare RVC) and H (viewpoint aspect *guò*). In Condition C, the advanced and native speakers behave similarly ($p = .951$), but the intermediate group is different from the advanced ($p = .004$) and from the natives ($p = .007$). In Condition H, the advanced and native speakers are again similar in behavior ($p = .951$), but the intermediate group is different from the advanced ($p = .017$) and from the natives ($p = .027$). In all other conditions, all learners as are as accurate as the native speakers.

TABLE 3

Temporal Interpretation Choice Task: Accuracy Mean Percentages, SDs, *F*, *p*, and Eta-Squared Values from One-Way ANOVA Comparisons

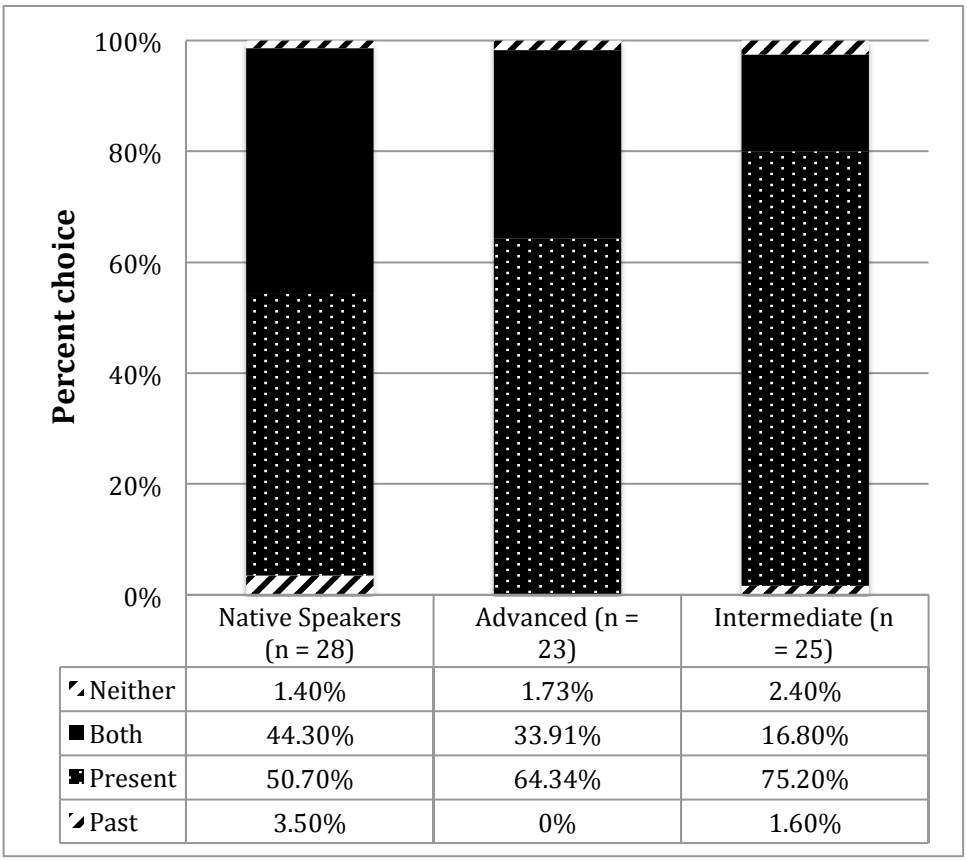
Condition	Expected Interpretation	Actual Native Interpretation	Native Mean Accuracy (%) and (*SD*)	Advanced Mean Accuracy (%) and (*SD*)	Intermediate Mean Accuracy (%) and (*SD*)	*F*(2,73)	*p*	η^2
A. Bare states	Present	Present, Both	95 (11.70)	98.26 (5.76)	94 (12.24)	1.076	.346	.029
B. Bare activities	Present	Present, Both	96.43 (9.51)	96.52 (9.82)	92.8 (15.14)	.82	.445	.022
C. RVC accomplishments	Past	Past, Present, Both	99.26 (3.87)	100 (0)	92 (14.14)	6.880	.002	.115
D. Viewpoint	Past	Past	94.28 (14.25)	98.26 (8.34)	90.4 (20.91)	1.54	.221	.041

aspect *le*								
E. RVC + viewpoint *le*	Past	Past	91.14 (13.8)	94.78 (8.97)	84.2 (24.65)	2.295	.108	.059
F. Viewpoint aspect *zài*	Present	Present	92.85 (11.17)	96.52 (11.52)	90.4 (18.36)	1.149	.323	.031
G. Viewpoint aspect *zhe*	Present	Present, Both	94.28 (10.69)	93.91 (17.51)	88.8 (25.21)	.692	.504	.019
H. Viewpoint aspect *guò*	Present	Past, Present, Both	98.57 (5.24)	100 (0)	87.2 (28.79)	4.327	.017	.106

However, this very high accuracy is not the whole picture. As Table 3 shows, in some conditions native responses were spread over Past, Present, and Both interpretations, setting chance at 75%, while others with two correct responses set chance at 50%. Thus, accuracy responses are not particularly informative about the actual distribution of temporal choices of natives and learners. In order to address the latter question, group mean choices were plotted as segments of a single bar adding up to close to 100%, see Figures 2–9 for all conditions.

FIGURE 2

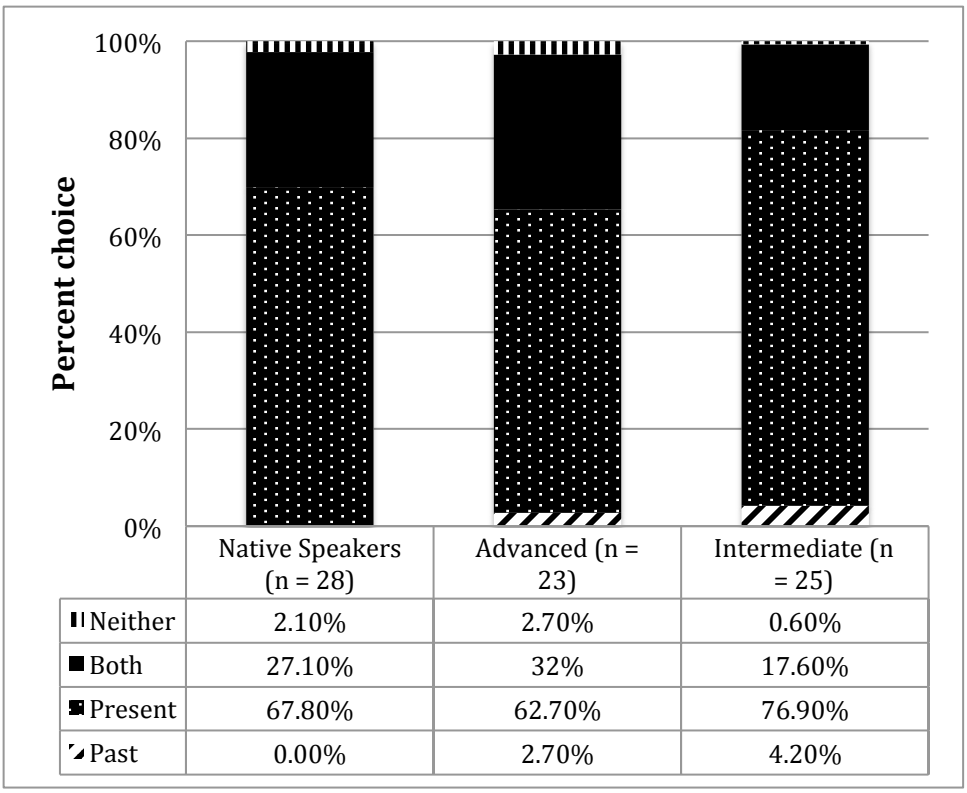
Interpretation of Bare States



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	1.40%	1.73%	2.40%
Both	44.30%	33.91%	16.80%
Present	50.70%	64.34%	75.20%
Past	3.50%	0%	1.60%

FIGURE 3

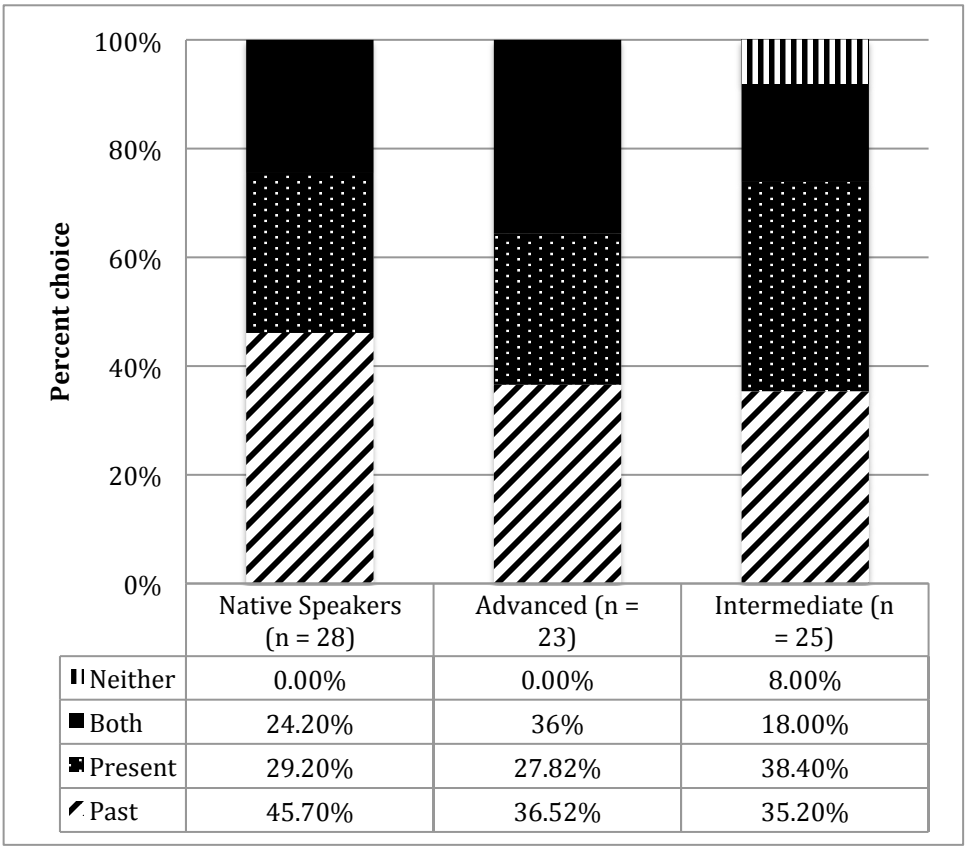
Interpretation of Bare Activities



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	2.10%	2.70%	0.60%
Both	27.10%	32%	17.60%
Present	67.80%	62.70%	76.90%
Past	0.00%	2.70%	4.20%

FIGURE 4

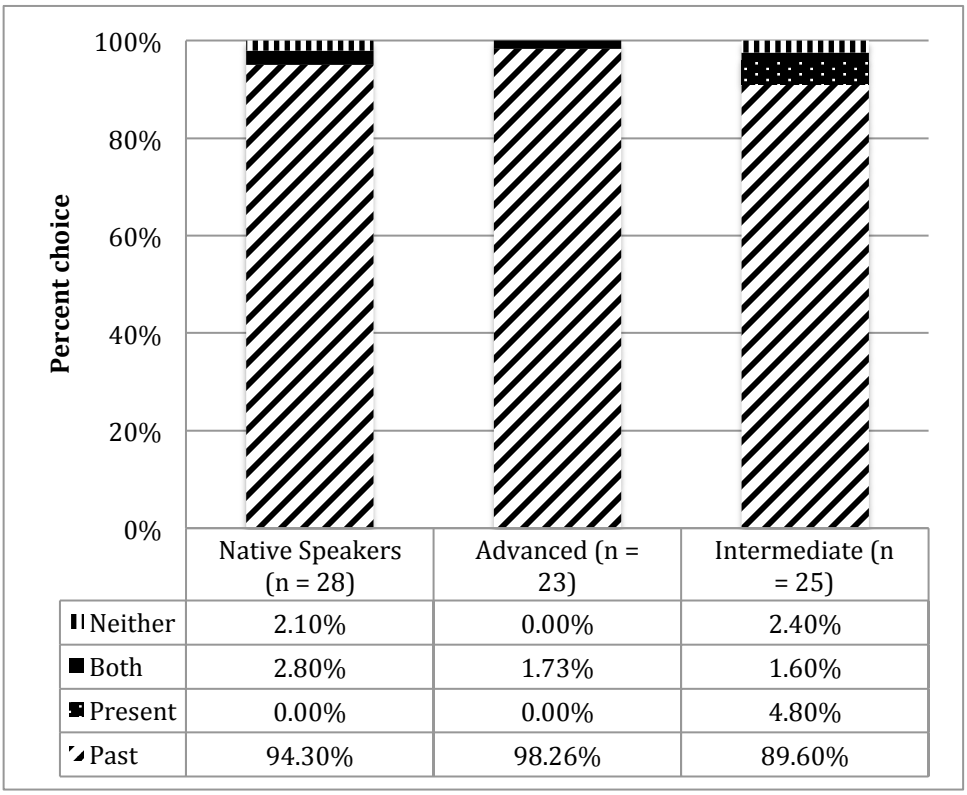
Interpretation of RVC Accomplishments



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	0.00%	0.00%	8.00%
Both	24.20%	36%	18.00%
Present	29.20%	27.82%	38.40%
Past	45.70%	36.52%	35.20%

FIGURE 5

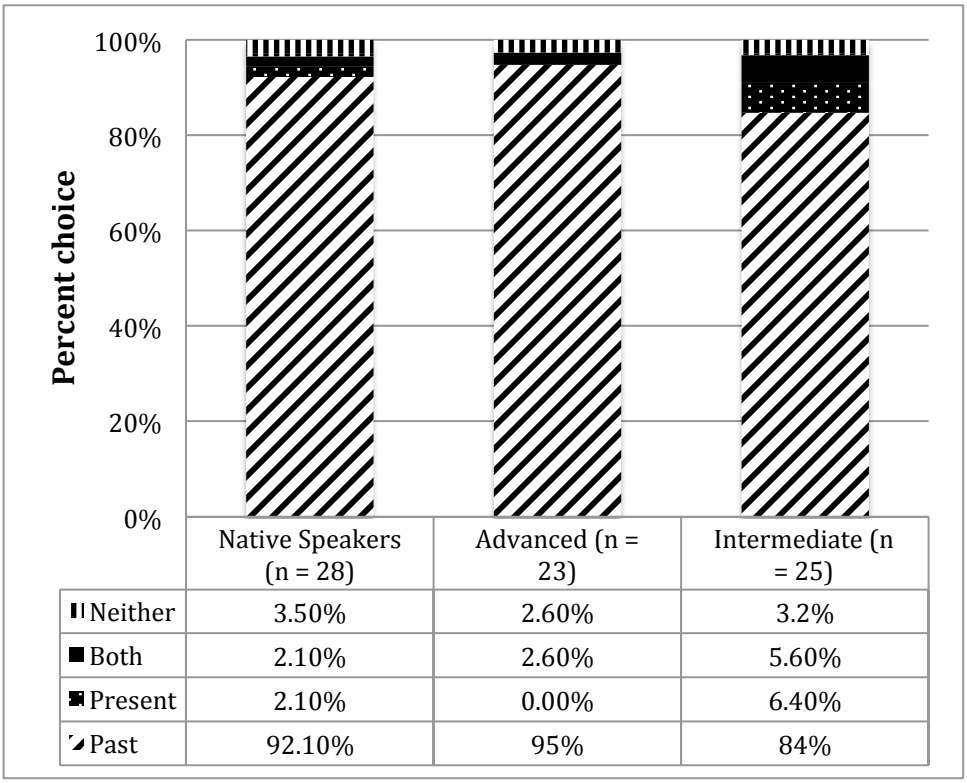
Interpretation of Sentences with *le*



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	2.10%	0.00%	2.40%
Both	2.80%	1.73%	1.60%
Present	0.00%	0.00%	4.80%
Past	94.30%	98.26%	89.60%

FIGURE 6

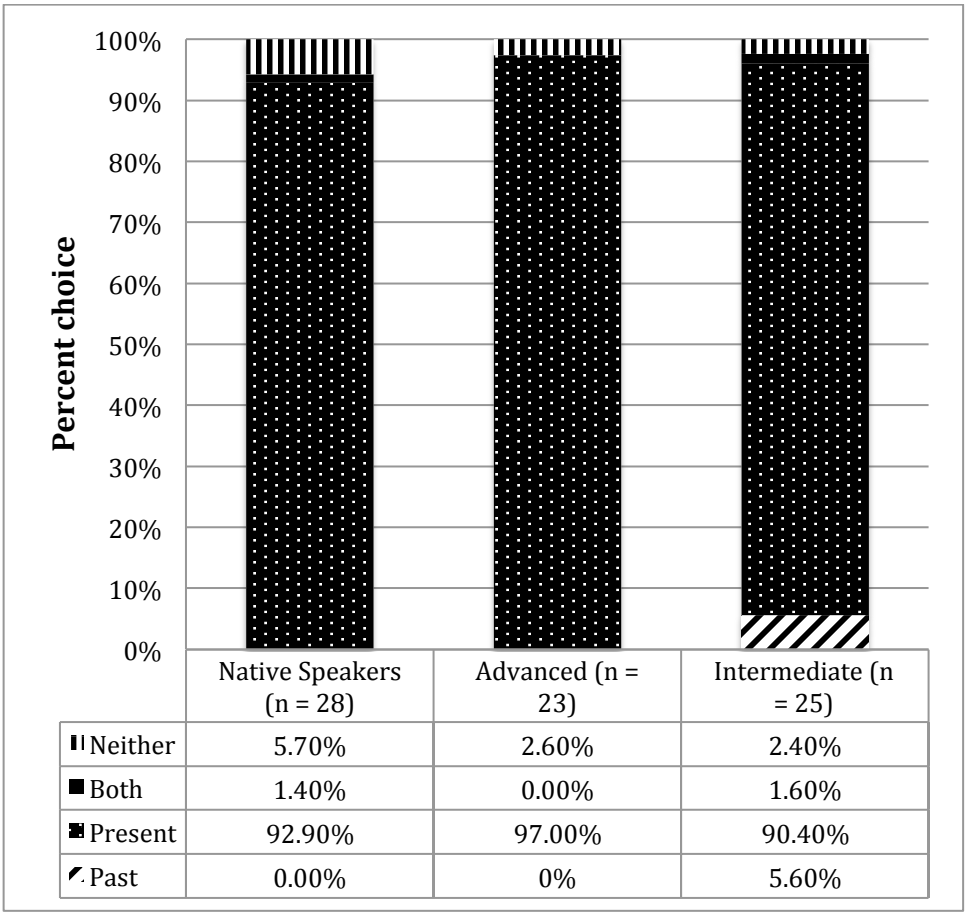
Interpretation of Resultative Verb Complex + *le* Construction



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	3.50%	2.60%	3.2%
Both	2.10%	2.60%	5.60%
Present	2.10%	0.00%	6.40%
Past	92.10%	95%	84%

FIGURE 7

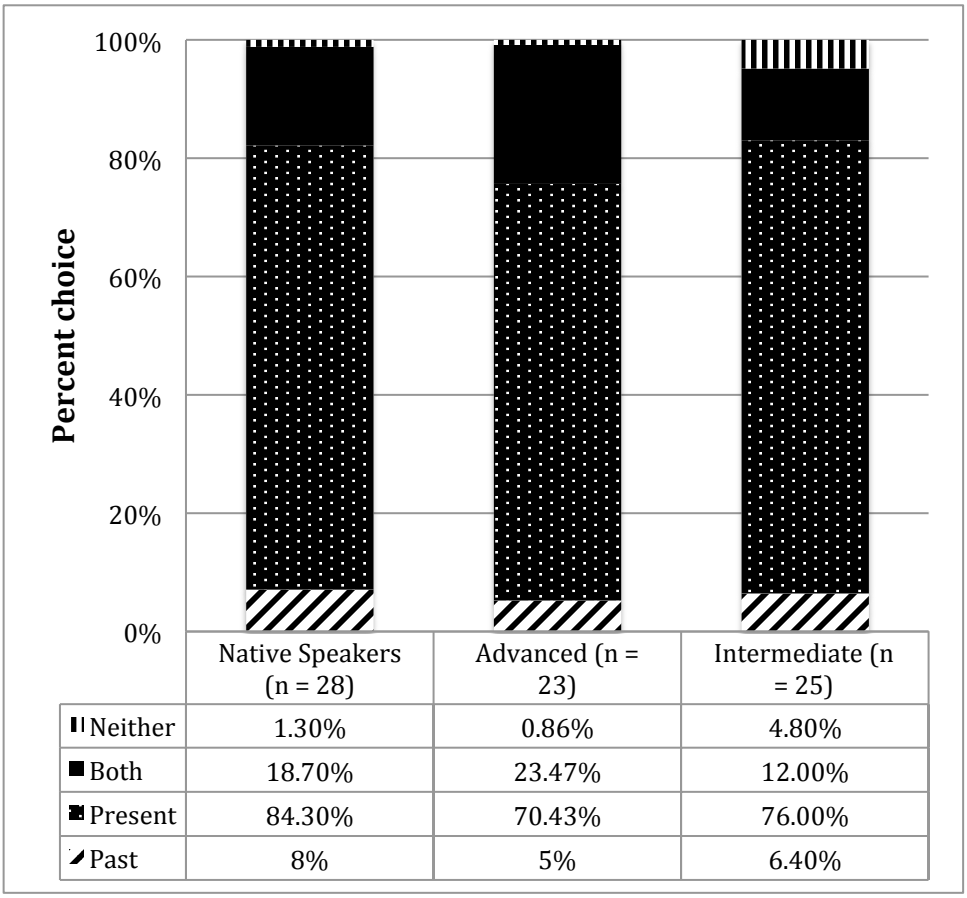
Interpretation of Sentences with *zài*



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	5.70%	2.60%	2.40%
Both	1.40%	0.00%	1.60%
Present	92.90%	97.00%	90.40%
Past	0.00%	0%	5.60%

FIGURE 8

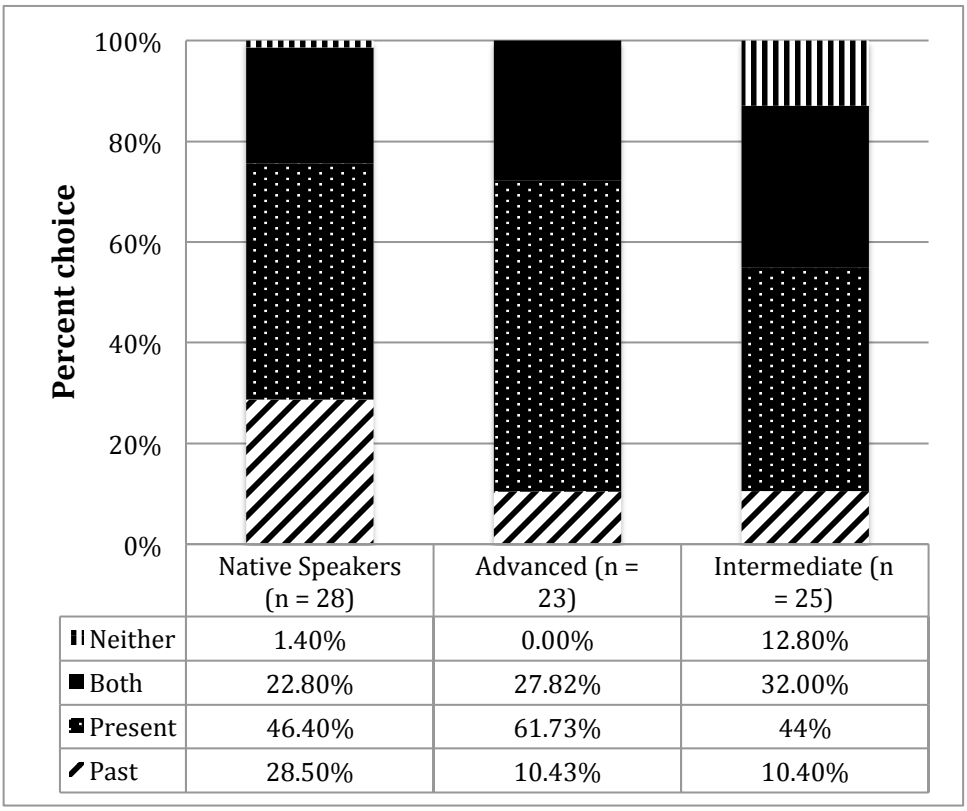
Interpretation of Sentences with *zhe*



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	1.30%	0.86%	4.80%
Both	18.70%	23.47%	12.00%
Present	84.30%	70.43%	76.00%
Past	8%	5%	6.40%

FIGURE 9

Interpretation of Sentences with *guò*



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	1.40%	0.00%	12.80%
Both	22.80%	27.82%	32.00%
Present	46.40%	61.73%	44%
Past	28.50%	10.43%	10.40%

One striking feature in the visual presentation of Mandarin speaker choices is that advanced speakers are making temporal choices very similar to the native choices. There is no condition in which the behavior of the learners radically departs from the natives' patterns. Interesting as well is the fact that, on the two conditions where a main effect of group was found—RVC accomplishments (Figure 4) and *guò* (Figure 9)—the advanced speakers are performing more in line with the expectations of the deictic pattern than the natives are.

In order to statistically assess the impressions from the qualitative (visual) inspection, the temporal choice frequencies of all groups were entered in chi-squared analyses, whose results are shown in Table 4. This test determines whether the temporal interpretations of the speaker groups are independent of each other. As previously mentioned, the raw frequencies of temporal choices were entered in the calculations. For example, in the Bare States condition, the natives chose the past interpretation five times, the present interpretation 71 times, both past and present possible 62 times, and neither two times. For the advanced learners these frequencies were 2, 74, 39, and 0, respectively. The probability that these group frequencies are independent is not statistically significant at $p = .102$. However, the same comparison between the interpretive choices of the native and intermediate learners yields a $p < .0001$. The choices of these groups appear to be significantly different. A look at Figure 2 shows that this is because the intermediate learners chose present interpretations for bare states with a higher frequency than the natives, in line with the expectations of the deictic principle.

TABLE 4

Chi-Squared Test of Independence Results for Learner and Native Speaker Groups

	Chi-Squared Test of Independence for Native and Advanced Chinese Speakers ($df = 3$, $N = 242$)			Chi-Squared Test of Independence for Native and Intermediate Chinese Speakers ($df = 3$, $N = 260$)		
Condition	χ^2	*p*	Cramer's *V*	χ^2	*p*	Cramer's *V*
A. Bare states	6.19	.103	.176	27.88	< .0001	.283
B. Bare activities	.716	.87	.054	8.399	.038	.179
C. RVC accomplishments	4.93	.177	.127	12.93	.005	.221
D. Viewpoint aspect *le*	2.898	.235	.107	7.356	.061	.168
E. RVC + viewpoint *le*	2.756	.431	.104	5.496	.139	.144
F. Viewpoint aspect *zai*	3.142	.208	.111	9.644	.022	.191
G. Viewpoint	4.596	.204	.134	3.357	.340	.113

aspect *zhe*						
H. Viewpoint aspect *guo*	15.210	.002	.245	25.594	<.0001	.312

Note. Shaded cells contain significant *p* values.

<B>Stories Task

The Stories Task offered participants the same choice of temporal interpretations (Past, Present, Both, Neither) for the last sentence in the story as the Temporal Interpretation Choice task. However, the stories contained an explicit temporal adverbial at least three clauses away from the sentence whose temporal reference had to be interpreted. The native speaker results did not completely conform to the deictic pattern, which postulates that adverbials will take scope over the aspectual information. Although stories started with adverbials such as *when I was a child*, a sizable proportion of native responses were Present (33.60%).

ANOVA (RM) on the accuracy scores returned an Effect of Condition (past story, present story) ($F[73,1] = 24.637$, $p < .0001$, partial eta squared = .252, observed power = .998); an Effect of Group ($F[73,2] = 9.785$, $p < .0001$, partial eta squared = .211, observed power = .979); and significant Condition by Group Interaction ($F[73,2] = 3.281$, $p = .043$, partial eta squared = .082, observed power = .606). Post hoc Tukey HSD tests showed that the native and advanced groups

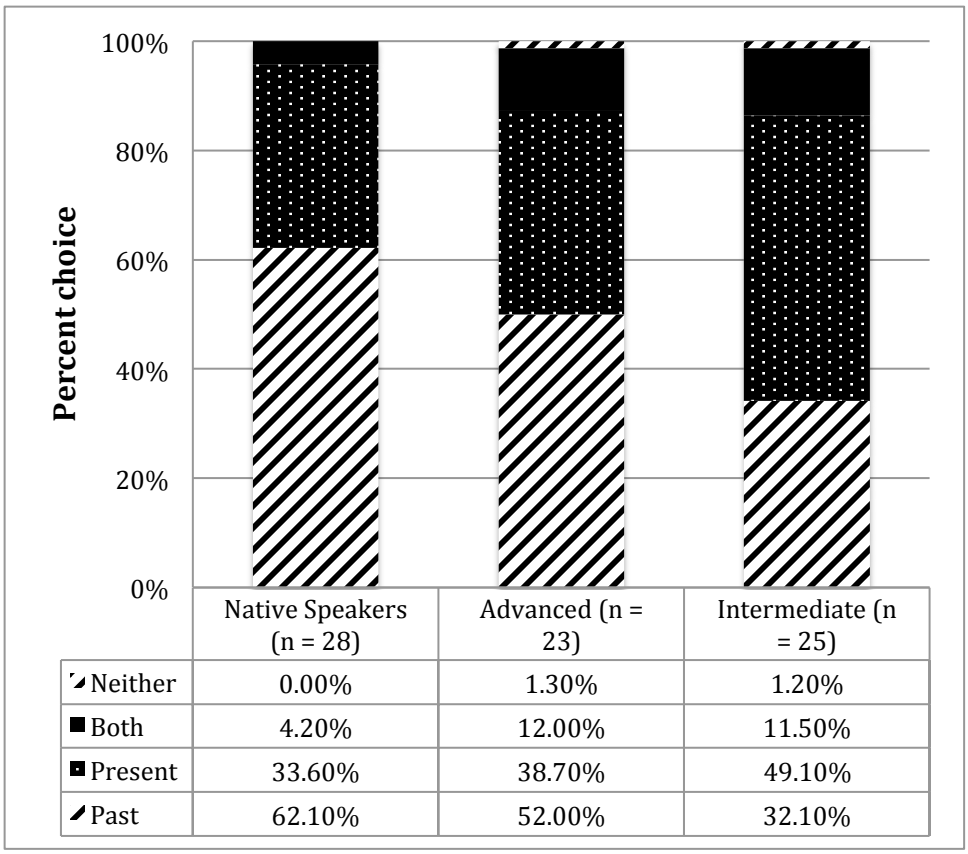
performed similarly ($p = .107$), while the intermediate learners differed from the natives ($p < .0001$).

Accuracy results with Past, Present, and Both considered as correct choices for the condition with the past temporal adverbial differed significantly between groups, as one-way ANOVA indicates (natives $M = 100\%$, $SD = 0$; advanced learners $M = 99\%$, $SD = 4.17$; intermediate learners $M = 92.8\%$, $SD = 12.75$; $F[73,2] = 6.702$, $p = .002$, $\eta^2 = .155$). Natives and advanced speakers did not differ ($p = .328$) but the natives and intermediate group performed differently ($p = .009$). However, only Present showed up as the correct choice for the present adverbial stories, as expected (natives $M = 97.14\%$, $SD = 8.96$; advanced learners $M = 86.08\%$, $SD = 20.39$; intermediate learners $M = 79.2\%$, $SD = 21.19$; $F[2,73] = 7.2$, $p = .001$, $\eta^2 = .165$). Both learner groups' performance differed significantly from that of the natives: $p = .036$ for the advanced group and $p = .002$ for the intermediate group.

As Figures 10 and 11 illustrate, learners' temporal choices did not pattern as those of the natives in this task. The chi-squared test of independence returned the following results on the two comparisons: Habitual past stories, native vs. advanced χ^2 (3, $N = 242$) = 9.30, $p = .026$, Cramer's $V = .127$; native vs. intermediate χ^2 (3, $N = 260$) = 31.224, $p < .0001$, Cramer's $V = .347$); Ongoing present stories, native vs. advanced χ^2 (3, $N = 242$) = 9.05, $p = .028$, Cramer's $V = .127$; native vs. intermediate χ^2 (3, $N = 260$) = 21.16, $p < .0001$, Cramer's $V = .347$).

FIGURE 10

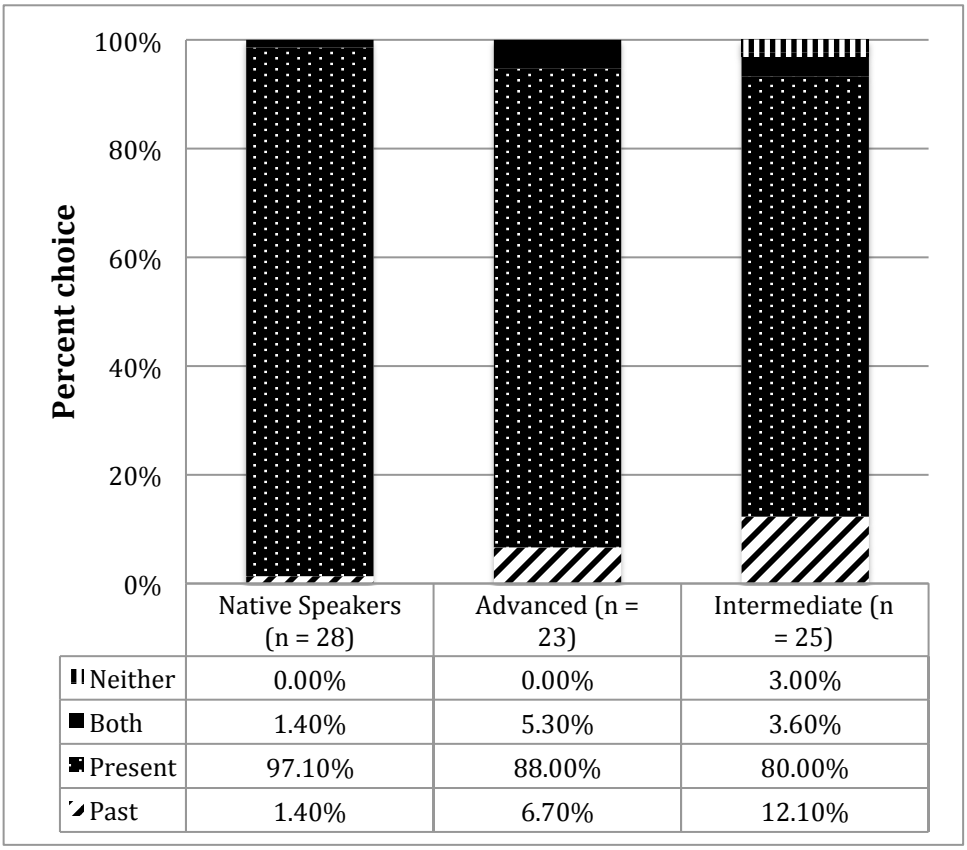
Sentence Interpretation in Habitual Past Stories



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	0.00%	1.30%	1.20%
Both	4.20%	12.00%	11.50%
Present	33.60%	38.70%	49.10%
Past	62.10%	52.00%	32.10%

FIGURE 11

Sentence Interpretation in Ongoing Present Stories



	Native Speakers (n = 28)	Advanced (n = 23)	Intermediate (n = 25)
Neither	0.00%	0.00%	3.00%
Both	1.40%	5.30%	3.60%
Present	97.10%	88.00%	80.00%
Past	1.40%	6.70%	12.10%

<B>Translation Task

Table 5 presents accuracy on the Translation Task. Accuracy was coded only in terms of the use of a past, present, and future tense in English. There were no occurrences of the present perfect, as these tests sentences did not include *-guò*. The tenses speakers used most of all were the past and present simple, past and present progressive, and future modals.

TABLE 5

Accuracy Mean Percentages and SDs on Translation Task, *F*, *p*, and Eta-Squared Values from One-way ANOVA Comparison

Condition	Native Speakers *M* and *(SD)*	Advanced Learners *M* and *(SD)*	Intermediate Learners *M* and *(SD)*	*F*(2,73)	*p*	η^2
A. Accomplishments + *zài* 'ongoing'	97.85% (6.29)	96.52% (11.54)	72.8% (27.16)	16.461	< .0001	.311
B. Activities + *le* 'terminated action'	99.28% (3.77)	96.52% (7.75)	79.2% (22.71)	16.673	< .0001	.3
C. Accomplishments with future modal	97.85% (8.32)	99.13% (4.17)	84% (24.49)	7.702	.001	.174
D. Activities with future adverbial and future modal	100% (0)	99.13% (4.17)	96% (8.16)	4.196	.019	.103

E. States with past adverbial	97.85% (8.83)	99.13% (4.17)	71.2% (32.7)	16.291	< .0001	.309
F. Activities with *zài* with past adverbial	96.43% (13.39)	94.78% (8.97)	65.6% (34.89)	15.503	< .0001	.298

The overall accuracy of the native speakers was 98.2%, which addresses the potential issue of whether the native Chinese speakers are accurate enough in their L2 English in order to be able to capture their Chinese interpretations. The overall accuracy of the advanced speakers was 97.5%, and of the intermediate learners 78.13%. Repeated Measures ANOVAs on the whole dataset for this task returned a significant Effect of Condition (F[5,365] = 11.250, $p < .0001$, partial eta squared = .134, observed power = 1); a significant Effect of Group (F[2,73] = 20.176, $p < .0001$, partial eta squared = .365, observed power = 1); and a significant interaction (F[10,365] = 6.252, $p < .0001$, partial eta squared = .146, observed power = 1). Tukey HSD post hoc tests established that natives and advanced speakers did not differ in their behavior ($p = .981$), but intermediate and native speaker behavior differed significantly ($p < .0001$), and so did the intermediate and advanced speaker behavior ($p < .0001$). One-way ANOVAs for each separate condition are reported in Table 5. This pattern of group difference (native = advanced ≠ intermediate), established for the whole set of translation data, was repeated in every individual condition without fail. More precisely, the p-values of the comparisons between native and advanced speakers were as follows: for condition A, $p = .186$; condition B, $p = .426$; condition C. $p = .77$; condition D, $p = .328$; condition E, $p = .426$; condition F, $p = .824$. The p-values of the comparisons between native and intermediate speakers were all highly significant at $p < .0001$.

<A>DISCUSSION

The objective of this experimental study was to find out whether intermediate and advanced classroom learners of Mandarin Chinese will be able to adequately comprehend the temporal reference of sentences in isolation and in context, in the absence of dedicated temporal morphology. One line of reasoning about acquisition difficulty (Cho & Slabakova, 2014; DeKeyser, 2005; Slabakova, 2009; among others) predicted that this acquisition task would be complicated by the one-to-many relationship between the temporal meaning and its expressions. On the other hand, since learners are using universally available meaning computation mechanisms and have access to universal pragmatic principles, another line of reasoning suggested by Dietrich et al. (1985) and based on Smith and Erbaugh (2005) predicted that acquisition would be easy. We are now in a position to evaluate the two opposite claims. The results obtained in the present experimental study appear to support the second line of reasoning. The accuracy of the advanced Chinese speakers largely patterned with that of the native speakers in the Temporal Interpretation Choice Task and the Translation Task. What is more, the temporal options they selected were also mostly in line with those the native speakers selected, as evidenced by chi-squared tests of independence. The intermediate learners deviated from native patterns considerably more, but they were still high above chance on all conditions, indicating

that they were capable of interpreting temporal references adequately. These findings are in line with the findings of Fan (2005) who found an accuracy rate of about 85% in a similar temporal interpretation task for fourth semester classroom learners, which is equivalent to the intermediate learners in this study. Temporal reference in the absence of temporal morphology does not appear hard to acquire, and is mostly in place after four semesters of Chinese classes.

While the overall accuracy of all participants was quite high, there are still interesting differences among the different conditions. For one thing, not all the predictions of the deictic pattern were supported to the same extent, although they were not flatly contradicted by the findings. The reader should keep in mind that the deictic pattern is a pragmatic implication relying on inference and context, akin to the second maxim of quantity (Grice, 1975). Thus one should be careful to formulate it using phrases such as *tend to*, as in bounded situations *tend to* be interpreted as past, unbounded situations *tend to* be interpreted as present. All pragmatic implications are defeasible. It turned out that all participants in the present experiment were sensitive to such pragmatic options and variability.

Let us inspect the native interpretation choices first from the perspective of the deictic pattern. In this discussion, it is useful to imagine the layers of temporal–aspectual information in a clause as structured and hierarchical, both in the syntax of the clause as well as conceptually. The verbal phrase is the bottom layer and it reflects the situation (lexical) aspect of a potential

event or state. Take, for example, the verbal phrase *eat a sandwich*. It is telic because it has a potential endpoint, but it is not anchored yet in the discourse with viewpoint and tense information. Adding past time anchoring and viewpoint aspect in English, results in either *He ate a sandwich* or *He was eating a sandwich*. Note that adding imperfective viewpoint aspect in *He was eating a sandwich* defeats the telicity of the verb phrase, the so-called Imperfective Paradox (Dowty, 1979) where even though it is in the past, the event cannot be viewed as complete. Finally, adverbs offer another, and higher, layer of aspectual meaning (de Swart, 1998), although adverbs in English cannot contradict the tense value: *He was eating a sandwich yesterday when I saw him* or *He will be eating a sandwich at 7am tomorrow*. Generally speaking, the higher-encoded temporal information can cancel or supersede any of the values lower in the structure.

Bare states and activities were expected to be interpreted as present, but native speakers indicated that they could see two possible interpretations for them: Present or Both. In the same way, RVC accomplishments were supposed to be interpreted as past, but natives chose the Past interpretation in only 45% of responses, choosing Present and Both roughly equally (29.2% and 24.2%). Thus, we are seeing the defeasibility of the pragmatic implications having an effect on temporal choices. The lowest aspectual information is not considered stable enough by native speakers to use it as definitive temporal reference. However, judgments did not go *against* the

deictic pattern, as bare states and activities were not interpreted as *only* Past by (many of) the native speakers, while bare accomplishments were interpreted that way.

At the next level of aspectual information, the viewpoint aspect level, one can see the deictic pattern in action: Sentences with *le* were overwhelmingly interpreted as past, sentences with *zài* were overwhelmingly interpreted as present. The same was true of sentences with *zhe*, although to a slightly lesser extent: Natives chose the present interpretation 84.3% of the time. The difference in the interpretations of *zhe* and *zài* is intriguing and is left for further research. In the case of *guò,* the errors may to some extent have been an artifact of the experimental materials inasmuch as participants had to choose from two grammatical English sentences, as shown in (16).

(16) Tā qù-guò xīn jiànshēnfáng

He go-Asp new gym

A. He had been to the new gym.

B. He has been to the new gym.

C. Both meanings are possible.

D. Neither meaning is possible.

Logically speaking, both choices A and B reflect the perfect meaning of *-guò,* which is that a gym visit has occurred in the past. In order for only A to be correct, we need a reference event in

the past, with respect to which the gym-visiting event is evaluated, such as, *He had already been to the gym twice when he bought a year membership.* Although there was no context to offer such a reference event, it is entirely possible that some speakers took such a past event into account. The past and present perfect tenses are complicated aspectual tenses in English and it is also possible that the Chinese native speakers' relative inexperience with the past perfect was a reason for their choice. However, at present this explanation is only speculative. In any event, it is true that the aspectual meaning of *-guò* is the most intricate one and tricky to associate with past and present reference. We can fairly confidently conclude, though, that the deictic pattern successfully predicted the temporal behavior of the structurally higher, hence aspectually more stable, viewpoint morphemes.

The behavior of the native speakers is important in the present experiment for one more reason: they provide the input to which the Mandarin learners are exposed.[7] In order to acquire the expressions of Chinese temporality (tested through comprehension in this study), learners have to track the narrative context, the discourse cues, the lexical and viewpoint aspect cues as provided by Chinese speakers and teachers. The behavioral patterns of both advanced and intermediate proficiency speakers were in accord with those of the native speakers. This is evident in all the figures from 2 to 9 but is particularly striking in the graphs visualizing the states, activities, and accomplishments choices (Figures 2, 3, and 4). The variability of the native

speaker choices was replicated in the choices of the learners. Thus, even intermediate speakers did not choose Past as the single interpretation of states and activities, which is a striking confirmation both of the deictic pattern and learners' sensitivity to the relative instability of this aspectual information. Furthermore, in the case of choosing an interpretation for *le*, learners may have been told by their teachers that this morpheme did not mean past, but they overwhelmingly chose a past interpretation for the whole sentence. All in all, the behavior of the learners, in agreement with the behavior of the natives, largely obeyed the deictic pattern. In this sense, no large consequence should be attributed to the significant differences uncovered by the statistical analyses, because intermediate learners are always bound to differ from natives in linguistic behavior. The important conclusion to be drawn is the appropriate pattern of the learners' temporal choices, prompted and aided by the universal pragmatic principle.

Choices in the Stories Task seemed to challenge the deictic principle again: The habitual stories started with a past time adverbial, but native speakers were not in complete agreement that the last sentence in the story had to be interpreted as past and returned roughly one third Present responses. As in the case of the Temporal Interpretation Choice Task, both groups of learners patterned closely with the natives, even when their choices were not exactly as predicted by the deictic principle. Accuracy of 92.8% on past stories and 79.2% on present stories (where chance was 25%) is a substantial achievement for intermediate learners. Therefore it can be

concluded that the interpretation of temporal adverbs did not present a major difficulty to the nonnative Chinese speakers.

The results of the Translation Task indicate a clear line of development in interpreting the most complicated temporal combinations. In this task, speakers were faced with conflicting information on the three aspectual levels: situation (lexical) aspect, viewpoint aspect, and temporal adverbials. The accuracy of the intermediate learners was relatively high with the future modal *huì* (84% and 96%), but ranged between 65.6% and 79.2% with the other combinations, see Table 5. However, the translations of the advanced speakers were above 95% accurate in every condition, and not significantly different from the natives. Intermediate learners were more attuned to the lower viewpoint aspect than to the higher adverbials, especially in conditions E (states with past adverbial) and F (activities with *zài* and past adverbial). This pattern is reminiscent of the behavior of the children acquiring Chinese (Huang, 2003) and of Yang's (2002) adult learners. However, the advanced speakers in this experiment demonstrated that native-like behavior in temporal interpretation was fully attainable.

To summarize, the results of all three tasks, which differed in complexity, indicate that advanced and even intermediate learners of Mandarin Chinese correctly interpreted the universal meanings of past, present, and future. The lack of transparent form–meaning mapping did not provide an insurmountable barrier to successful acquisition. The performance of the

experimental participants, learners and bilingual native speakers alike, was remarkably similar. The research outcomes confirm that the universal deictic pattern is a pragmatic tendency, and that both natives and learners are sensitive to its defeasibility. In the cases where learners obeyed the deictic pattern more closely than the native speakers did, the latter revealed themselves to be more acutely aware of possible contextual scenarios that would defeat the pragmatic implications. The learners obeyed the deictic pattern to a larger extent, which agrees with other findings on the acquisition of pragmatic universals (e.g., Slabakova, 2010). Perhaps surprisingly, learning to interpret Mandarin temporality did not prove to be very difficult.

Previous research on the acquisition of English temporal morphology, and especially the interpretation of findings by Gabriele and Maekawa (2008), coupled with the processing results of Chan (2012), suggest that the deictic principle is also in action when Chinese speakers approach English. However, it works against them to some extent. The added step they need to make is to learn that the morphological marker is always needed, to provide it in obligatory contexts, and to acquire sensitivity to its absence in processing. This added step appears to be a big hurdle. A bidirectional Chinese–English study would be is necessary to address this issue definitively.

So what do the findings of this L2A research study imply for teaching practices? The message is surprisingly upbeat and constructive. The universal deictic pattern that learners are

assumed to obey is not taught overtly in language classrooms, although some information on temporal interpretation is made available in the classroom.[8] This is just as well. First of all, lexical classes of verbs do not need to be taught explicitly, because they are largely the same as in English (with the exception of the entailments of accomplishments). Aspectual viewpoint morphemes, however, need to be introduced and drilled, not only for their aspectual meanings, but because they are crucial in interpreting temporal meanings as well. Importantly, situations where temporal adverbials offer conflicting information to the lexical and viewpoint aspect marking, such as *He was disappointed yesterday*, show the learners that adverbials have precedence in the temporal interpretation over any other information. This is, of course, a universal state of affairs, but an abundance of clear and unambiguous examples provided by the teacher will aid the learners in figuring it out. All in all, nothing needs to be drastically changed in teaching practices. A good variety of temporal values (past, present, future) in classroom discourse and narratives certainly aids the learners in acquiring this morphosyntax–semantics mismatch, but it should be smooth sailing indeed.

Finally, the methodological points mentioned in the materials section merit further discussion. There were two reasons why bilingual native speakers (native Mandarin, L2 English) were invited to participate in this experimental study. First, the intention was to probe temporal associations in Chinese, but the Chinese language does not easily allow for a design with explicit

paraphrases of two temporal choices. If Chinese-only test sentences and paraphrases had been used, the task would have been unnatural. More importantly, such a task would have been uninformative as to what temporal meanings speakers compute *without* the help of explicit adverbs, since all explicit paraphrases would have had to involve adverbs.

Second, this research was planned to support the spirit of the Bilingual Turn (Ortega, 2009). Following Cook (2003, 2008) and Singleton (2003), Ortega argues that bilinguals should no longer be compared to monolingual controls in L2A research. There are many reasons why monolingual–bilingual comparisons look more and more like comparing apples and oranges, but arguments from neuroscience seem particularly compelling. The seemingly trivial observation that experience changes the mind/brain has now been well established (see Bialystok, 2009, for one review). With respect to the property under investigation, one could surmise that learning another language where tense is morphologically encoded, as is the case in English, has enriched the repertoire of temporal expressions of the Mandarin native speakers with the English-type expression. Thus, comparing bilingual native and nonnative speakers of Mandarin, we can assess just the effect of nativeness on their temporal choices, while (somewhat) neutralizing the effect of inhibition of English, because all participants have to engage in that inhibition.

<A>CONCLUSION

In this article, the hypothesis was explored that a grammatical meaning encoded by a variety of lexical morphemes and multi-functional (nondedicated) inflectional morphemes would be hard to acquire in a second language (Cho & Slabakova, 2014; DeKeyser, 2005; Slabakova, 2009). The opposite prediction, that acquisition of Chinese temporality would be easy to acquire, was based on Smith and Erbaugh's (2005) deictic pattern of encoding temporality. If this pattern were indeed universal, it was predicted to aid the learners in their acquisition of temporal marking. The hypotheses were tested with comprehension data from the native and nonnative judgments of Chinese–English bilinguals on the temporal reference of Mandarin sentences in isolation and in context. Findings of the Temporal Interpretation Choice Task indicated that learners were indeed guided by the default deictic pattern, although to different extents. When the native judgments were categorical, learner choices were also categorical; when natives indicated in their choices that temporal meanings might vary, learners' choices also fell in that same range. The Story Task results suggest that intermediate learners had more difficulty than advanced ones in using the remote adverb for temporal information. The Translation Task results point to a development in acquiring the most complex combinations of temporal meanings. The combined findings indicate learner sensitivity to the universal deictic pattern and the linguistic input even at intermediate proficiency levels. The pedagogical implication is that universal grammatical meanings do not present great difficulty to learners, and can be acquired easily if

classroom discourse includes a variety of temporal meanings paired with unambiguous, native-like expressions of those meanings.

ACKNOWLEDGMENTS

The author is immensely grateful to four research assistants, at the time graduate students and Chinese instructors at the University of Iowa, where this experiment was conceived and accomplished: Yi–Tzu Huang, Wenyu Lu, Zhengwei Qiao, and Jia Zhu. Without Yi–Tzu, Wenyu, Jia, and Zhengwei, their hard work and good cheer, this experimental study would have been impossible. I thank my colleagues at Iowa, Chuanren Ke and Helen Shen, for their guidance, and Judith Liskin–Gasparro for throwing the best parties in Iowa City, at which one could discuss Chinese temporality over dumplings. Many thanks go to Bei Yang for recruiting her students as participants and Joseph Binney for taking the test and recruiting friends. I am grateful to Elina Tuniyan and Wei Lin for checking the Mandarin in the final version of the manuscript. Finally, this article is dedicated to the memory of Carlota Smith.

NOTES

[1] In discussing second language learning, I am assuming that the process involves building a mental grammar that underlies comprehension as well as production. Whether an L2 learner has acquired some property can in principle be tested in comprehension or production. It is likely that the results would be different, because production adds a further burden on the lexicon and on the grammatical system. In a nutshell, comprehension is considered to be easier than production. In this experimental study, only comprehension is investigated in the hope that it gives us insight into the speakers' linguistic competence without the additional burden of production.

[2] In the semantics literature, temporality is used to refer to the meaning of tense (location in time) as well as to aspect; both are cognitive notions referring to the relationship between situations and times. However, in the interest of terminological clarity, I shall use the adjectives *temporal* and *aspectual* as referring to location in time and to aspect, respectively.

[3] This study is not concerned with achievements, the other telic lexical aspectual class.

[4] This is a production study. To my knowledge, comprehension of temporality in child Mandarin has not been studied. However, the same linguistic competence underlies both comprehension and production.

[5] It is true that presenting Chinese sentences in isolation makes them sound unnatural. However, it was a necessary feature of the research design aimed at neutralizing the confound of discourse context. In a confirmation of the fact that discourse is crucial for the comprehension of Chinese temporality, native speakers and learners alike pointed to the possibility of more than one temporal interpretation on many occasions (see results section).

[6] The power of the group effect is below .8, which suggests a heightened risk of Type II error (that the null hypothesis postulating no difference between groups is false, but cannot be rejected). The reader should be cautious about this analysis of variance.

[7] Without exception, the Chinese teachers at the universities where this experimental study was conducted were native speakers of Chinese.

[8] Fan's (2005) study is valuable also because she reports on how the viewpoint morphemes are taught in the classroom:

> In the Chinese first-year materials in use, verb-final *le* is first introduced as a 'dynamic particle' signifying realization or completion of an action or an event. It is emphasized from the beginning that *le* does not equal the past tense in English because it can be combined with future situations. The grammar explanation and the exercises both direct students' attention to a specific time adverbial and a quantified object that co-occur with *le*. . . . (*Zhèng)Zài* is introduced in main clauses with 'when' subordinate clauses and is

> explained to express [sic] the ‘ongoing process of an action at a certain point of time.’ Also called a ‘dynamic particle’ in the textbook, *guò* is introduced in the second semester of the first year. It is said to denote a past experience, which did not continue to the present but has an impact on the present. (p. 65).

Fan’s observations on classroom instruction are largely true the universities where most of the current experimental participants were studying Chinese.

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