The second language acquisition of the Chinese aspect marker *"le"*

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Abstract

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The aspect marker *le* is a central temporal marker in the Chinese tense-aspect system and is a complicated language element for L2 learners to acquire. Previous L2 studies have looked only at learners' production data and have generally concluded that English native speakers transfer the English past tense to Chinese aspect *le* (Zhao, 1996; Jin & Hendricks, 2003; Teng, 1999; Yang, 1999).

My preliminary question is whether English native speakers transfer the English past tense to Chinese aspect marker *le* in their comprehension. For this question, I run a grammaticality judgment (GJ) task. In this task, I examine whether learners know that *le* can co-occur with future or present adverbials. The results suggest that English learners accept the concurrence and do not equate the past tense and *le*. This result argues against the previous claim. Then how do English learners interpret the verbal *le*? In present study I run three interpretation tests where the verbal *le* occurs in different contexts. In the first interpretation task, I examine how learners interpret the interaction of *le* and four kinds of verbs based on the classification of Vendler/Dowty. The results show that learners consistently interpret

le as perfective even when it shows imperfective function concurring with some activities and statives. The explanation for it is that learners transfer the perfective function of English *–ed* to the verbal *le* and/or over generalize the perfective function of the verbal *le*. Based on GJ test and the first interpretation test, we understand that learners know that the verbal *le* is an aspect marker and they performed very well on the interaction of *le* and achievements/accomplishments in sentences with a single event. The second interpretation test is to investigate whether learners can integrate the temporal information for the interaction of *le* and achievements/ accomplishments correctly in complex contexts. I give participants paired sentences with two successive events which were almost the same except one is past tense and the other is future tense. The second interpretation test is timed by Paradigm. An example is shown below.

a. Wo xie *le* xin yihou cai qu *le* gongyuan. (Past event)
I write LE letter after then go LE park.
I went to a park after I wrote the letter.

b. Wo xie *le* xin yihou zai qu gongyuan. (Future event)
I write LE letter after then go park.
I will go to a park after I write the letter.

In these two sentences above, the tense of the first events is deduced from the tense of the second events. Due to the lack of this kind of deduction in English tenses, we predict learners will have difficulty on the temporal interpretation of the sentences with two events even though they can correctly interpret the interaction of *le* and achievements/accomplishments in single event; they will perform better for the past

sentences than the future sentences due to both events in past sentences including *le* and consistently defaulting past tense. The results show that learners cannot distinguish the temporal difference between the two sentences and did poorly for both future and past sentences. An additional interesting result is that native speakers take longer to interpret future tense of sentence (b) than past tense of sentence (a). The explanation is that native speakers slow down in future tense due to the temporal information conflict in the first and second events. In the third timed interpretation task, I am interested in whether explicit temporal adverbs help learner's interpretation. They performed poorly on the combination of *le* and activities/statives in test 1, and on the sentences with two events in test 2. So the sentences in this test add temporal words in sentences on which they did poorly. The results show that temporal words help a lot in learners' interpretation and native speakers' processing of the verbal *le*. The possible explanation is that the temporal words give subjects clear time reference like English tense markers and overwhelm the temporal integration required by the aspect marker *le*.

In short, this paper describes and tries to explain some interesting phenomena in interpretation and processing of the aspect marker *le* which have not been investigated previously. This study shows much broader factors of L1 influence and supports that the temporal semantic information affects sentence processing. Consequently, my study will contribute to the understanding of interpretation in second language acquisition as well as semantic processing.

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1. Introduction

1.1 Aspect markers assume the function of tense in Chinese

All languages have ways of encoding both tense and aspect. Traditionally, tense is understood as the location of an event or state on a time axis relative to the speech time (Reichenbach, 1947; Comrie 1985). When an event or state takes place or holds before/after the speech time, the tense is past/future tense; when an event or state overlaps with the speech time, the tense is present tense. The examples in (1) show the relation of the tense and the speech time.

(1) a. He came here. (Situation time precedes the speech time – past tense)
b. He will come here. (Situation time is after speech time—future tense)
c. He likes swimming. (Situation time overlaps with the speech time – present tense)

Aspect, on the other hand, refers to how an event unfolds in time, such as whether an event is on-going or has already been completed (Comrie, 1976; Chung and Timberlake, 1985; Smith 1991, 1997). Aspectual meaning is mainly determined by both lexical aspect and grammatical aspect (Smith 1991, 1997). Lexical aspect refers to the Vendler/Dowty four-way classification (Vendler 1967, Dowty 1979), classifying verb phrases into achievements, accomplishments, activities and statives according to their temporal features such as ‘dynamicity’, ‘durativity’ and ‘telicity’ (we will discuss this in next section). Grammatical aspect "is characterized as

different ways of presenting a situation as a completed whole, viewed as if from outside, or as an ongoing, incomplete action of state, viewed as if from inside" (Comrie 1976); the former is called perfective aspect and the latter is called imperfective aspect.

According to the three times proposed by Reichenbach (1947), the temporal location of a situation includes reference time (RT, from which "the speaker invites his audience to consider the event" (Taylor 1977, 203)); situation time (SitT, the time of the situation is expressed) and speech time (ST). Tense focuses on the relationship of situation time and speech time; aspect focuses on the relationship of situation time and reference time. For perfective aspect, the situation time precedes the reference time; for imperfective aspect, the situation time overlaps with the reference time. The examples in (2) show the relation of aspect and reference time.

(2) a. He read the paper. (Situation time precedes the reference time – perfective aspect)
b. He was reading the paper. (Situation time overlaps with the reference time-imperf.)

Different languages mark tense and aspect in different ways. English expresses tense and aspect with different grammatical morphemes, and tense and aspect have separate systems. For example, "V- *(s)*" is for present tense and "V-*ing*" is for progressive aspect. In some cases, tense and aspect are conflated, for example past tense in English also indicates perfectivity (Smith, 1991).

Chinese, on the other hand, only has aspect morphemes and does not have tense morphemes. How does Chinese encode tense in a sentence? It has been argued that aspect markers play an important role in tense expression in Chinese (Smith & Erbaugh 2004; Lin 2003; Chang 1998). Generally, at the sentence level of Chinese, tense is encoded by two different linguistic forms: lexical words such as temporal adverbs *zuotian* (yesterday), which is the direct way to express tense and aspect markers such as *le, guo, zhe*, which is the indirect way to indicate tense. When there are no lexical words or other contexts in sentences, the tense is generally decided by aspect markers. From these examples in (3), we can see that perfective markers *le* in sentence (3a) and *guo* in sentence (3c) default past tense; imperfective markers *zai* in sentence (3b) and *zhe* in sentence (3d) default present tense.

(3) a.Ta diu *le* yi fu shoutao. (Past, perfective)
He lose LE One CL. Glove.
He lost a pair of gloves.

b. Ta *zai* kan shu. (Present, imperfective)
He ZAI read book.
He is reading a book.

c. Ta qu *guo* nar. (Past, perfective)
He go GUO there
He had been there.

d. Yuehan chuan *zhe* yi jian hong chenshan. (Present, imperfective)
John wear ZHE one CL red shirt.
John is wearing a red shirt.

Smith & Erbaugh (2004) point out that in Mandarin the default temporal expression given by aspectual markers is that "Imperfective morphemes convey that a situation is unbounded-taken as Present; perfectives convey that a situation is bounded, and sentences with these forms are taken as Past" (p715). Certainly, the temporal possibilities are not limited to this. Smith & Erbaugh further point out that "bounded events may be located in the Future, and states or ongoing events may be in the Past or Future" (p715). These departures from the default are mainly expressed by two methods: adverbial information and other contexts like sentences that contain two or more successive events. In (4a), the reference time is "now" and the default tense for (4a) is past tense. The sentence in (4b) includes temporal words *mingtian zhege shihou* (at this time tomorrow), and thus the reference time changes from "now" to "at this time tomorrow". The tense of the sentences is changed from past of (4a) to future of (4b).

(4) a. *Wo yijing dao le Beijing.* (Past, perfective)
I already arrive LE Beijing.
I already arrived at Beijing.

b. Mingtian zhege shihou, *wo yijing dao le Beijing*. (Future, perfective)
Tomorrow this time I already arrive LE Beijing.
At this time tomorrow, I will have already arrived at Beijing.

In (5a), the reference time is "now" and the default tense is present. The sentence (5b) adds temporal words to (5a), and the reference time changes from "now" to

"zuotian wudian (yesterday five o'clock)". The tense of the sentence is changed from present of (5a) to past of (5b).

(5) a. *Ta zai chi wanfan.* (Present, imperfective)
He ZAI eat supper.
He is eating his supper.

b. Zuotian wudian, *ta zai chi wanfan.* (Past, imperfective)
Yesterday five o'clock, he ZAI eat supper.
Yesterday at five o'clock, he was eating his supper.

The default tense for the sentence (6a) is past tense, which means the event has already finished and he has already gotten to Beijing; the sentence (6b) is future tense which means he has not gotten to Beijing yet. In the sentence with two successive events (6b), the second event encodes the future tense which means the first event also not finished.

(6) a. Ta dao *le* Beijing.
He get LE Beijing.
He got to Beijing.

b. Ta dao *le* Beijing zai qu kan nage pengyou.
He get LE Beijing then go visit that friend.
He will visit that friend after he gets to Beijing.

In short, temporal words encode tense in the direct way and aspect markers encode tense in the indirect way at Chinese sentence level. Chinese aspect markers can default tense when there are no temporal words or other contexts. And the temporal information defaulted by aspect markers can be changed by temporal words or other events present in the sentence.

1.2. Motivation

In English, the simple past encodes both past tense and perfectivity (Smith, 1991); tense and aspect are conflated. Chinese, on the other hand, does not encode tense morphosyntactically, but has a wide array of aspect markers. *"Le"* is a central aspect marker in Chinese and can encode perfectivity in past and future tense as is shown in (7a) past tense and (7b) future tense.

(7) a. Wo yijing dao *le* Beijing. (Past, perfective)
I already arrive LE Beijing.
I already arrived at Beijing

b. Mingtian zhege shihou, wo yijing dao *le* Beijing. (Future, perfective)
Tomorrow this time I already get LE Beijing.
At this time tomorrow, I will have already gotten to Beijing.

However, *le* interacts differently with different lexical aspectual types and it can encode imperfectivity when combined with some activities and statives. For example, it encodes imperfectivity as is shown in (8a) and (8b).

(8) a. Ta yang *le* liang tiao gou. (Activities, present progressive)
He raise LE two CL dog.
He is raising two dogs.

b. Qiang shang gua *le* yi fu hua. (Statives, present progressive)
Wall on hang LE one CL painting.
There is a painting on the wall.

Therefore the goal of the Chinese learner is to learn that *le* is an aspect marker that can occur in any tense and also that the perfective or imperfective interpretation of *le*

depends on the particular verb phrase that it interacts with. Given that English does not have an aspect marker with these properties, the interpretation of *le* presents an interesting area for L2 research. In addition, English tense is explicitly expressed by tense markers, but Chinese tense is deduced from other contexts in some situations. For example the tense of the first event depends on the tense of the second event in sentences with two successive events.

(9) 他买了房子以后才结了婚。 (Past)
Ta mai *le* fangzi yihou cai jie *le* hun.
He buy LE house after then get LE married.
'He got married after he bought his house.'
a. He bought a house.
b. He will buy a house.

(10) 他买了房子以后再结婚。 (Future)
Ta mai *le* fangzi yihou zai jiehun.
He buy LE house after then get married.
'He will get married after he buys the house.'
a. He bought a house.
b. He will buy a house.

For sentences (9) and (10), the first events "buy the house" are exactly same literally, but they indicate different tense due to the tense of the second event "get married". The past tense of the second event determines the past tense of the first event in sentence (9); the future tense of the second event determines the future tense of the first event in sentence (10). Given this difference of tense expression between English and Chinese, this is also an interesting area for L2 research. Previous L2 studies have looked only at learners' production data and have generally concluded that English native speakers transfer the English past tense to Chinese aspect *le*.

However, these studies have not teased apart past tense and perfectivity, have not mentioned the imperfective function of the verbal *le* nor have they addressed the interpretation of *le*.

My thesis addresses these gaps in the current body of research. In section 2, I introduce the lexical and grammatical aspect system of Chinese. In section 3, I introduce the previous research on first and second language acquisition of aspect marker *le*. In section 4, I report a study in which I conclude that learners do not equate the verbal *le* to past tense marker; they always interpret *le* as perfective even when it occurs with activities and statives. Learners can successfully interpret the interaction of *le* and accomplishments/achievements in sentences with a single event, but they cannot correctly integrate the temporal information for it in sentences with two successive events. However, both learners' problems of interpreting tense indicated by indirect way (i.e. aspect marker *le*) can be solved by temporal words --- the direct way of expressing tense. Also, the results show that native speakers take longer to processing the sentences when the verbal *le* occurs in future events than in past events. However, with the help of temporal words, there is no processing difference between future and past events for native speakers. In section 5, I discuss these results in more detail. I argue that learners possibly transfer the perfective function of English past tense to the verbal *le* and/or possibly overgeneralize the perfective function from the verbal *le*; temporal words give learners explicit temporal reference, which overwhelm the temporal function of the verbal *le*.

2. Aspectual system of Chinese

Smith's (1991, 1997) two-component aspect model of aspect argues that aspect consists of both situation aspect at the semantic level and viewpoint aspect at the grammatical level. Situation aspect (also called lexical aspect/VP aspect) encodes the aspectual implication of the verb phrase, and is classified by Vendler/Dowty into four classes of verb phrases (I will discuss it in section 2.1). Grammatical aspect is encoded in verbal inflectional morphology, for example by perfective (such as English past tense -ed) and imperfective (such as English progressive morphology -ing) grammatical morphemes. Any language can express the same situation types, but grammatical aspect is realized in different ways in different languages (Smith, 1991). Situation aspect and viewpoint aspect are independent but interact with each other (we will see this in detail in section 2.4), so we go through the interaction of verb classes with the verbal *le* in my study. Situation aspect is composed of inherent features whereas viewpoint aspect is composed of non-inherent features of aspect (cf. Comrie 1976). In this chapter I will introduce situation aspect and viewpoint aspect in general and then discuss aspect in Chinese in detail.

2.1 Situation aspect

2.1.1 The basic situation type of languages

The classification of situation aspect proposed by Vendler (1967) is normally considered the first influential classification. Vendler classified verbs into states, activities, accomplishments and achievements using three binary features:

[±dynamic], [±durative] and [±telic], as shown in table 1. Telic means having an inherent endpoint; durative denotes having duration; and dynamic denotes requiring energy to sustain the situation. Although he used some verb phrases to distinguish activities and accomplishments, his classification is based on verb level.

Table 1. Vendler's four verb classes

Class	[±dynamic]	[±durative]	[±telic]	Examples
STA	--	+	--	Know, love, believe, possess
ACT	+	+	--	Run, walk, swim, push a cart, knock, tap
ACC	+	+	+	Run a mile, walk to school, paint a picture
ACH	+	--	+	Recognize, spot, find, lose, reach, win

The four-way distinction can be expressed in the following way (Shirai & Andersen 1995, 744):

> Achievement: event takes place instantaneously, and is reducible to a single point in time
> Accomplishment: the event has some duration, and has a single clear inherent endpoint
> Activity: the event has duration, but with an arbitrary endpoint, and is homogenous in its structure.
> State: the event is not dynamic, and can continue without additional effort or energy being applied.

Dowty (1972, 1979) explained the four Vendler classes with a primitive stative predicate and a finite set of semantic operators. Stative verbs as the basic component are derived from the observation that statives just have a single point in time while other categories require a referent to multiple points in time. For example, to evaluate whether the statement *Martha knows French* is true or not, we only need to check one point in time; for the statement *Martha built a sandcastle*, we need to check both the initial point and final point of the event. The set of semantic operators includes BECOME, CAUSE and DO. Statives do not make use of these operators and directly correspond to basic stative predicates in the logical structure. Other categories of verbs have logical structures with one or more of the aspectual operators. For example, achievements (die, arrive, etc) consist of the stative predicate (dead, be somewhere, etc) as well as the operator BECOME, which brings a particular state into existence that did not exist before.

Verkuyl (1972, 1993, and 1999) proposed that aspect is compositional and should be evaluated at the level of the verb phrase or sentence. For example, *run* and *run ten miles* are classified as activity and accomplishment respectively according to Vendler's four-way classification; the verb *run* is both an activity and an accomplishment, so the classification clearly cannot be at the verb level.

Based on Vendler, Smith (1997) proposed that situation aspect is related to 'verb constellations'; she suggested some rules for the interaction of verbs and arguments. However, there is not much difference between Smith's and Vendler's classification. The only obvious difference is that she separates this kind of verb such

as *cough*, *knock* and *tap* from Vendler's activities due to the parameter of [±durative]. This kind of verb is called "semelfactive".

Table 2. Smith's (1997) situation types

Class	[±dynamic]	[±durative]	[±telic]	Examples
STA	--	+	?[1]	Know the answer, love Mary
ACT	+	+	--	Laugh, stroll in the park
ACC	+	+	+	Build a house, walk to school
ACH	+	--	+	Win the race, reach the top
SEMEL	+	--	--	Knock, tap

In my opinion, semelfactive verbs per se contain the repeated events and show the durative and atelic nature, for example, *he knocks on the door* means repeated and atelic action. If one wants to emphasize the undurative action, i.e. just one time and not repeated, one needs to point this out in the sentence, for example, "*He knocked on the door twice"*. Also because the number of this kind of verb is small, and the combinations for semelfactives and activities with viewpoint aspects show the same pattern, I classify semefactives into activities like Vendler (1967).

2.1.2 Special points of situation type in Chinese

2.1.2.1 RVCs (Resultative Verb Compounds)

[1] Smith thinks that telic feature is not related to stative situation type, it is decide by other components at the sentential level. As examples "he lives here" vs. "he lived here ten years".

Based on Vendler's categorization, Tai (1984) first classified Chinese verbs and claimed that Chinese has no accomplishments. He came to this conclusion according to his famous example cited by many linguistic papers:

(1)Ta xie *le* yi feng xin, keshi mei xie-wan.
He write LE a CL letter, but not write-finish.
He wrote a letter, but he didn't finish it.

Usually accomplishments have a natural endpoint, so in English, "he wrote a letter" necessarily means "he finished the letter"; the sentence "he wrote a letter, but he didn't finish it" is awkward for native speakers. Tai thought in Chinese the verb phrase "xie *le* yi feng xin (write a letter)" is not an accomplishment because it is cancelable (example 1). However, example (1) is not accepted by some native speakers, and some Chinese linguists (Teng 1986, Li 1990, Lin 2003, Smith 1997, etc) have challenged his argument.

Tai claims all accomplishments are realized in Chinese in the form of resultative verb compounds (RVC) (p292). For example,

(2) Wo xie-wan *le* yi feng xin.
I write-finish LE one CL letter.
I wrote a letter.

The accomplishment *write a letter* in English is realized as *xie-wan le yi feng xin (write-finish a letter).* Thus, he claims Chinese has no accomplishments. He pointed out that the accomplishments and achievements in English are expressed by RVCs in Chinese. His examples are as follows:

(3) a.John learned Chinese. (Accomplishment verbs in English)
John xue-hui hanyu.
John study-know Chinese.

b.John found his book. (Achievement verbs in English)
John zhao-dao tade shu.
John look for attain his book.

The prominence of resultative construction in Chinese led Tai to combine RVCs with achievements into a single category of results.

Smith (1997) classified RVCs into accomplishments because they are [+telic] and [+durative]. Actually, RVCs emphasize the point when the action is achieved and not the durative process; Tai proposed that RVCs in Chinese have only resultative aspect, so they show the same features as achievements instead of accomplishments. Example (4) shows that RVCs cannot combine with progressive marker "zai" and durative marker "zhe", which is the characteristic of achievements, whereas accomplishments can co-occur with progressive marker "zai".

(4) a.* Wo *zai* xue-hui zhongwen.
I ZAI Study-attain Chinese.
I am learning Chinese.

b. * Wo zhao-dao *zhe* yi ben shu.
I look for- attain ZHE a CL book.
I found a book.

Also example (4b) shows that RVCs are like achievements: defaulting to past tense when they appear without tense and aspect markers. Thus, in my paper, I classify RVCs into achievements like Tai.

2.1.2.2 Mixed telic-stative verbs

Li (1990) discussed a special lexical class of verbs which is called mixed telic-stative verbs such as *chuan* (put on, wear), *ti* (pick up, carry) and *na* (take, hold). They can encode the process of the action or the state resulting from the action depending on which aspect markers they combine with; as a result they can work as accomplishments and statives. His examples are as follows:

(5) a.Yuehan *zai* chuan yi jian hong chenshan.
John ZAI put on one CL red shirt.
John is putting on a red shirt.

b.Yuehan chuan *zhe* yi jian hong chenshan.
John wear ZHE one CL red shirt.
John is wearing a red shirt.

c. Yuehan chuan *le* yi jian hong chenshan.
John wear LE one CL red shirt.
John is wearing a red shirt.

When *chuan* combines with progressive marker "zai" (5a), it means a process of the action; when *chuan* combines with durative marker "zhe" and perfective marker "*le*", it means stative. As for this kind of verb, I will regard it as both an accomplishment and a stative/activity. For the verbs which do not need energy to sustain the state such as "chuan (put on/wear", "gua (hang on/ hung), I regard them as accomplishments and statives; for the verbs which need energy to sustain the state such as "ti (pick up/carry)", "na (take/ hold)", I regard them as accomplishments and activities, like the activity "push a cart" under the classification of Vendler.

In short, Chinese has four basic situation types, as do other languages. Also there are some special kinds of verbs, which are classified into these four basic types in my paper.

2.1.3 Classification of Chinese situation aspect

Based on the four types model of Vendler (1967), the semantic temporal features ([±dynamic], [±durative] and [±telic]), and my integration of the analysis of previous research (Teng 1986, Chen 1990, Li 1990, Chang 1998, etc.), some examples of four different categories of lexical aspect are listed below.

Achievement: 1. si (die), dao (arrive), lai (come), faxian (find)…

2. RVCs: kan-dao(see), zhao-dao (find), ting-dong (listen-understand)…

Accomplishment:1. pao shili (run ten miles), xie yi feng xin (write a letter), jian yi zuo fangzi (build a house…

2. one meaning of mixed telic-stative: chuan yi jian hong yifu (put on a red clothes), ji yitiao lingdai (tie a necktie), na yi ben shu (take a book)…

Stative:

1. Absolute statives: dengyu (equal to), xing (surname), shi (be)…

2. Mental statives: ai (love), xihuan(like), xiangxin(believe), zhidao (know), renwei (think), wei(thought)

3. Existential statives (Part of the meaning of mixed telic-stative):

a. (part of the other meaning of mixed telic-

stative): gua yi fu hua(hang a painting), ji yitiao lingdai (wear a necktie) …

b. zhan yige ren(a person standing there), tang yigeren (a person lying there)

Activity: 1. paobu (run), xie xin (write letter), lianxi yingyu (practice Eng.)

2. Semelfactive: qiao men (knock at the door), kesou (cough), tiao (jump)…

3. Part of the meaning of mixed telic-stative: na yi ben shu (hold a book), ti yige shubao (carry a bag)…

2.2 Viewpoint aspect of Chinese

Viewpoint aspect varies significantly between languages; different languages grammaticize it in different ways. Viewpoint aspect "enables the speaker to present the event talked about from a particular temporal perspective" (Smith 1988, 230). If speakers focus on a situation in its entirety, including both initial and final end points, it is a perfective viewpoint; if speakers focus on part of a situation, including neither initial nor final end points, it is an imperfective viewpoint (Smith 1997, 3). Chinese is recognized as an aspect language, and there are many markers expressing aspectual meanings, such as *le, guo, zhe, zai, qilai, xiaqu*, and verb reduplication, which have different focuses when they present a situation perfectively /imprefectively (Xiao & McEnery 2004, 31). It is widely accepted that fully grammaticalized aspectual markers in Mandarin include: perfective marker *le* and

guo, imperfective marker *zai* and *zhe*. I will give examples of the four markers below.

The experiential marker *guo* means "having the experience of doing something at least once in the past" (Dai, 1997):

(6) a.Ta xihuan *guo* na ge nvhai. (Stative)
He love GUO one CL girl.
He had/has loved that girl.

b. Ta chi guo jiaozi. (Activities)
He eat GUO dumpling.
He had/has eaten dumpling.

The example (6a) shows that "he" has the experience of loving that girl and the event of loving that girl is not holding now. The example (6b) shows that "he" has the experience of eating dumplings.

The progressive marker *zai* shows an internal interval of duration and combines with durative and dynamic verbs such as accomplishments and activities; it cannot combine with achievements and statives. For example,

(7) a. Ta *zai* chang ge. (Activity, imperfective)
He ZAI sing song.
He is singing.

b. Ta *zai* xie san feng xin. (Accomplishment, imperfective)
He ZAI write three CL letter
He is writing three letters.

c. * Ta *zai* dao Beijing. (Achievement, imperfective)
He ZAI arrive Beijing.
He is arriving at Beijing.

d. *Ta *zai* xiangxin shangdi. (Stative, imperfective)
He ZAI believe in God.
He is believing in God.

The durative marker *zhe* also shows an interval of duration and combines with durative verbs such as statives and activities; it cannot combine with verbs that encode inherent endpoints such as accomplishments and achievements. For example,

(8) a. Men wai zhan *zhe* yi ge ren. (Stative, imperfective)
Door outside stand ZHE one CL man.
There is a man outside the door.

b. Ta chi *zhe* fan kan dianshi. (Aactivity, imperfective)
He eat ZHE meal watch TV.
He watches TV while eating.

c. * Ta si *zhe* (Achievement)
He die ZHE.
He is dying.

d. * Ta xie *zhe* san feng xin. (Accomplishment)
He write ZHE three CL letter.
He is writing three letters.

Zhe often combines with the verb describing the background of the other activity, like the example (8b).

Le is a complicated aspectual marker. The properties, function and interpretation of *le* are still debated among linguists now (Liu 1988; Wen 1995; Zhang 1995; etc). Native speakers (NS) can use it correctly but cannot explain it clearly and different native speakers may have different intuitions about some combination of *le* with certain verbs, such as the argument of whether “xie *le* san

fengxin (write LE three letters) has endpoint or not. Its complexity also can be seen from the acquisition process. According to previous research (Sun 1993; Zhao 1996; Huang 1998; etc), compared to other aspect markers, *le* is persistently difficult for second language learners. Although learners first acquire the high frequency aspectual marker *le*, the error rate for using *le* doesn't drop over time (Teng 1999). Even though the experiential *guo* and durative *zhe* are specific to the Chinese language, English learners can master them correctly in a short time. In my paper, I will focus on the most complex aspect marker—*le*.

2.3 Aspect marker — *le*

When the aspect marker *le* combines with most verbs, it presents a situation as a whole and the event is bounded, so most researchers call it a perfective marker. However, when it combines with some activities and statives, it indicates an on-going situation and the event is not bounded. In this section, I will briefly discuss the temporal feature of *le*. Before this, I will describe a decades-old debate on whether there are one or two *le*s.

2.3.1 One *le* versus two *le*s

The main rationale for people (Li 1990, J. Yang 2002, etc) who think there is one *le* is that the verbal suffix *le* and sentential final *le* share the same meaning: the situation expressed by the verb has been realized, so they can be treated as the same morpheme semantically. In examples (9a) and (9b), verbal *le* and sentential *le* both mean that the action *read* has already been realized.

(9) a. wo kan-wan *le* zhe ben shu.
I read-finish LE this CL book
I read this book. (Past tense)

b. wo kan-wan zhe ben shu *le*.
I read-finish this CL book LE.
I (have) read this book.

However, some language phenomenon related to *le* must be explained with two *le*s. In examples (10a) and (10b), if we posit that there is only one *le*, we cannot explain why sentence (10a) means finishing the book and sentence (10b) means not finishing the book.

(10)a. Zhe ben shu wo kan *le* san tian.
This CL.book I read LE three day
I finished this book in three days.

b. Zhe ben shu wo kan *le* san tian *le*.
This CL.book I read LE three day LE.
I have read this book for three days, (but haven't finished it).

Most people (Zhu 1982, Smith 1997, Teng 1999, Yang 1998, etc) hold that there are two *le*s in Chinese according to the different syntactic distributions and semantic functions and different historical backgrounds. First, syntactically, one *le* occurs after the verb, the other occurs in the end of the sentence. Second, historically, verbal *le* is from the verb *liao* "to finish, to come to an end". *Liao* and *le* are polyphones in Chinese, which means they have the same written form and different pronunciation. The verb *liao* is still used in a few situations, for example: *si liao* ("privately settle"

means settle out of court) (Xiao & McEnery 2004, 92). And *liao* and the sentential *le* can co-occur next to each other in modern Chinese. This is shown in (11),

(11) Wo he liao *le*.
I drink finish LE.
I finished the drink.

So the verbal *le* and the sentential *le* have different functions and should be analyzed as two *le*s.

Semantically, the sentential *le* is more complicated than the verbal *le*. Firstly, both the verbal *le* and the sentential *le* encode the actualization of the action. In examples (12), the *le* both in sentence (12a) and in sentence (12b) denotes a completed action; while the sentence (12c) denotes an unactualized action.

(12) a. Wo qu dianyingyuan *le*.
I go theatre LE.
I went to a theatre.

b. Wo qu *le* dianyingyuan.
I go LE theatre .
I went to a theatre.

c. Wo qu dianyingyuan.
I go theatre.
I will go to a theatre.

However, the semantic meaning of the sentential *le* is more complicated than the verbal *le.* In example (10), both the sentence (10a) and the sentence (10b) mean the actualization of the action “kan (read)”. However, the sentence (10a) also means a continuation of the action after the action is actualized due to the sentential *le,* which

encodes the meaning of current relevancy. Li & Thompson (1981, 240) proposed that the basic communicative function of sentence-final *le* is to indicate a 'currently relevant state' (CRS), which means "a state of affairs that has special current relevance with respect to some particular situation". Moreover, the CRS function is not the only function of the sentential *le*. Sometimes sentential *le* is only used as a modal particle to mark the speaker's attitude (Xiao & McEnery 2004, 131; Tiee 1986, 231; Zhang 1995, 127), and it can be deleted without influencing the aspectual meaning, for example,

(13) a. Zhe jian yifu tai da *le*!
This CL coat too big LE
This coat is too big.

b. Zhe jian yifu tai da.
This CL coat too big.
This coat is too big.

The difference for (13a) and (13b) is only the speaker's attitude. So, the meaning of the sentential *le* is more complicated than the verbal *le*.

In my paper, I take the side of two *le*s: the verbal *le* and the sentential *le*. In this paper, I will only focus on the verbal *le*.

2.3.2 The temporal feature of the verbal *le*

Verbal *le* is generally called a perfective marker, which encodes that the event happens immediately before or at the reference time (Smith & Erbaugh 2002), and the event can take place in any tense. Examples are given in (14).

(14) a. Zuotian, Wo dao *le* Beijing. (Past)
Yesterday, I arrive LE Beijing.
Yesterday, I arrived at Beijing.

b. Mingtian zhege shihou, wo yijing dao *le* Beijing. (Future)
Tomorrow this time I already get LE Beijing.
At this time tomorrow, I will have already gotten to Beijing.

c. Qiang shang gua *le* yi fu hua. (Present)
Wall on hang LE one CL painting.
There is a painting on the wall.

In sentence (14a), the reference time is "zuotian (yesterday)", and the event "dao (arrive)" ends before the end of the reference time; the tense is past. In sentence (14b), the reference time is "mingtian zhe ge shihou (at this time tomorrow)", and the event "dao (arrive)" happens before the reference time; the tense is future. At sentence (14c), the reference time is the speech time "now", the event "gua (hang)" happens at the reference time; the time is present.

Most researchers agree that the verbal *le* is a perfective aspect marker, which means that *le* indicates the viewing of a situation from outside, and the event is viewed as a whole. However, Lin (2003) pointed out the verbal *le* is a perfective and imperfective aspect marker. The reason is that the verbal *le* expresses on-going situations when it combines with atelic situation types. The examples from Lin (2003, 266) in (15) show the imperfective function of the verbal *le*.

(15) a. Ta chi *le* yi tiao yu.
He eat LE one CL fish
He ate a fish.

b. Ta yang *le* yi tiao yu.
He raise LE one CL fish.
He raises a fish.

c. Wo zu *le* yi jian gongyu.
I rent LE one CL apartment.
I rent an apartment.

Lin argued the sentence (15a) encodes the completion of the event. Examples (15b) and (15c) encode on-going situations and *le* is the imperfective marker. This poses a big problem for the opinion that the verbal *le* is a perfective marker. In my paper, I take the opinion that the verbal *le* can express both perfective and imperfective functions. The data shows that whether the verbal *le* denotes perfective or imperfective depends on verb situation type. I will analyze the temporal feature of the verbal *le* by the verb situation type.

2.3.2.1 The interaction of verbal *le* and achievements

All achievements can occur with the verbal *le* and mean the completion of the event no matter how arguments and non-arguments component change in the sentence, i.e. the completion of the event is inherent for achievements. *Le* is obligatory for monosyllabic achievements and is optional for disyllabic achievements. For sentence (16a) in which the verb is monosyllabic “diu (lost)”, *le* is obligatory; for sentence (16b) in which the verb is disyllabic “zhao-dao (find), *le* is optional.

(16) a. Ta diu *(*le*) liang fu shoutao.
He lose LE two CL Glove.
He lost two pairs of gloves.

b. Wo zhao-dao (*le*) liang ben shu.
I find-attain LE two CL Book.
I found two books.

Without the lexical time verbs, the sentences with achievements and the verbal *le* indicate the completion of the event and are translated into past tense in English. The verbal *le* interacting with all achievements shows perfective function.

2.3.2.2 The interaction of verbal *le* and accomplishments

All accomplishments can occur with the verbal *le* and mean the completion of the event. For accomplishments, monosyllabic or disyllabic, the verbal *le* is obligatory. Here are some examples.

(17) a. Ta xie *(*le)* san feng xin.
He write LE three CL letter.
He wrote three letters.

b. Ta pao *(*le)* shi yingli.
He run LE ten mile
He ran ten miles.

c. Ta miao-shu *(le) na fu hua.
He describe LE that CL picture.
He described that picture.

The verbal *le* with accomplishments is translated into the past tense in English and means the completion of the event (it means the completion of writing three letters in sentence (17a), the completion of running ten miles in sentence (17b)

and the completion of describing that picture in sentence (17c)). The verbal *le* interacting with all accomplishments shows perfective function.

2.3.2.3 The interaction of verbal *le* and activities

Generally, activities cannot occur with the verbal *le* if there is no temporal boundary for them. Here are some examples.

(18) a. *Wo chi *le* fan.
I eat LE meal.
I eat meal.

b. *Ta gai *le* fangzi.
He build LE house.
He builds house.

c. *Ta zu *le* fangzi.
He rent LE house.
He rents a house.

These examples of a bare noun form with the verbal *le* cannot be independent sentences. They sound like unfinished sentences. Only when activities take certain boundaries, the verbal *le* can occur with activities. When activities encode an endpoint and actually become accomplishments by taking certain boundaries, the verbal *le* interacting with them shows perfective function. In example (19), the activities take a temporal boundary and become accomplishments.

(19) a. Wo chi *le* liang ge xiaoshi de fan.
I eat LE two CL hour DE meal.
I ate a meal for two hours.

b. Ta gai *le* liang nian de fangzi.
He build LE two year DE house.
He built houses for two years.

c. Ta zu *le* liang nian de fangzi.
He rent LE two year De house.
He rented a house for two years.

When there is a temporal boundary for the event (eating meal for two hours; building house for two years; renting house for two years), the verb phrases become accomplishments. The verbal *le* can occur with activities.

In examples (20), activity in the first event is bounded by the second event, so activity becomes accomplishments semantically and can occur with the verbal *le*.

(20) a. Wo chi *le* fan jiu qu shang ke.
I eat LE meal then go take class.
After I eat the meal, I'll go to class.

b. Ta gai *le* fanzi cai jiehun.
He build LE house then get married.
After he built the house, he got married.

The second event provides a temporal boundary for the first event; activities with the verbal *le* mean the completion of the first event in example (20). In example (21), the quantified objects provide activities with endpoint and make activities become accomplishments.

(21) a. Wo chi *le* liang dun fan.
I eat LE two CL meal
I ate two meals.

b. Ta gai *le* wu zuo fangzi.
He build LE five CL house.
He built five houses.

For sentences (21a) and (21b), the activities “chi fan (eat meal); gai fangzi (build houses)” change to accomplishments “chi liang dun fan (eat two meals); gai wu zuo fangzi (build five houses)” which have inherent endpoints.

In example (19), (20), and (21), the temporal words, the second events and quantified objects provide endpoints for activities, and thus the verbal *le* can co-occur with them. The verbal *le* encodes perfective function.

However, when activities don’t indicate an endpoint even by taking certain boundaries, the verbal *le* interacting with them show imperfective function.

(22) a. Ta tui *(*le)* yi liang che..
He push LE one CL cart.
He is pushing a cart.

b. ta yang *(*le)* liang tiao gou.
He raise LE two CL dog.
He is raising two dogs.

The verbal *le* is obligatory and encodes the on-going situation in the example (22). They are translated into the present tense in English. This kind of dynamic verb does not encode telicity even with a quantified object.

2.3.2.4 The interaction of verbal *le* and statives

Most statives cannot occur with the verbal *le* if there is no temporal boundary for them, for example,

(23) a. Ta xing *le* Wang .
He surname LE Wang
His surname was Wang.

b. Liming ai *le* Xiaojuan.
Liming love LE Xiaojuan
Liming loved Xiaojuan.

When there is a boundary, the verbal *le* can occur with statives and show perfective function.

(24) a. Ta xing Wang xing *le* shi nian.
He surname Wang surname LE ten year
His surname has been Wang for ten years.

b. Liming ai *le* Xiaojuan shi nian.
Liming love LE Xiaojuan ten year
Liming loved Xiaojuan for ten years.

The appearance of the temporal boundary “ten years” for the state “love and surname” makes the verbal *le* directly occur with statives in example (24), which encode termination. The verbal *le* shows perfective function here.

However, when statives don’t indicate end point even by taking certain boundaries, the verbal *le* interacting with them show imperfective function.

(25) a. Qiang shang gua *(*le)* yi fu hua.
Wall on hang LE one CL painting.
There is a painting on the wall.

b. Men wai zhan *(*le)* yi ge ren.
Door outside stand LE one CL man.
There is a man standing outside the door.

The verbal *le* is obligatory and means the continuation of the state resulted from the action in the two sentences above. Existential statives with the verbal *le* encode the on-going situation and are translated into present tense in English.

2.3.2.5 Summary

When the verbal *le* combines with achievements and accomplishments without other temporal context, it means the completion (bounded) of the event and is translated into past tense of English. And the verbal *le* indicates the perfective function. When the verbal *le* combines with most of the activities and statives that take temporal boundaries, it means the termination of the event and is translated into past tense in English. And the verbal *le* indicates the perfective function. When the verbal *le* occurs with certain activities and statives, which don't have endpoints even taking the quantified objects, it means the on-going of events and indicates an imperfective function. The result is summarized below.

Table 3. The aspect properties and defaulted tense expressed by the interaction of verbal *le* and verbs

		Verbal *le*	
		Temporal meaning	Correspondent tense
Telic events	ACH	Perfective	past
	ACC	Perfective	past
	ACT &STA (containing the end point by taking certain boundary)	Perfective	past
Atelic events	ACT &STA (no end point even taking certain boundary)	Imperfective	**PRESENT**

2.4 The temporal feature of the English suffix *-ed*

In English, the simple past encodes both past tense and perfectivity (Smith, 1991); tense and aspect are conflated in *-ed*.

Past tense only locates the situation in the past, without saying anything about whether that situation continues to the present or not (Comrie, 1985). However, the suffix *–ed* also means that the event is completed or terminated in English. For non-stative verbs, past tense means that the event is bounded (Smith 1997, 170; Gabriele 2005, 32): achievements and accomplishments have inherent endpoint, so past tense means the completion of the event. Activities have only arbitrary endpoints, so past tense means the termination of the event.

(26) a. Zachary arrived. (Achievement) (Gabriele 2005, 32)
b. Mrs Ramsey wrote a letter. (Accomplishment) (Smith 1997, 170)
c. Lily swam in the pond. (Activities) (Smith 1997, 170)
d. He pushed two carts. (Activities)

Sentences (26a) and (26b) mean the completion of the "arriving" and "writing a letter". Sentences (26c) and (26d) mean the termination of swimming. For statives, the endpoint is open which means the event may have an endpoint, or maybe not (Comrie 1985, 41; Smith 1997, 170). Here are some examples.

(27) a. Sam owned three peach orchards. (Smith 1997, 170)
b. John lived in London. (Comrie1985, 40)
c. There were three persons outside the door.

For the sentence (27a), whether Sam still owns orchards or not is open (Smith): Sam maybe owns orchards now, maybe not. For the sentence (27b), whether John still lives in London or not is open (Comrie); maybe John still lives there or maybe not. However, the context often implicates that it doesn't continue to the present and the past tense locating a situation in the past suggests that the situation does not hold at the present, otherwise the present tense would be used (Comrie, 1985, 40). So for all verbs, the past tense suggests that situations do not hold at the present and mean perfective.

2.5 Comparison of Chinese verbal *le* with English simple past tense

In this section, I will compare Chinese verbal *le* with English simple past tense.

First, the aspect marker *le* means that the event happens before the reference time, so it is possible to use *le* in sentences where actions occur in the future. The example (28) containing the aspect marker *le* encodes future tense because of the future temporal adverbials “at this time tomorrow”.

(28) Mingtian zhege shihou, *wo yijing dao le Beijing*. (future, perfective)
Tomorrow this time I already get LE Beijing.
At this time tomorrow, I will have already gotten to Beijing.

However, English past tense means that the event happens before the speech time and only can occur in past event. The 1st prediction is that if English learners of Chinese transfer the English past tense to Chinese aspect *le*, learners will regard the event with verbal *le* as a past event and regard the combination of the verbal *le* and future lexical word such as in the example (28) as ungrammatical.

Secondly, when English past tense and Chinese verbal *le* combine with achievements and accomplishments, they show the same temporal meaning: the completion of the event. The second prediction is that learners would correctly comprehend the verbal *le* with achievements and accomplishments when there are no temporal words:

Chinese:
(29) a. Ta diu *(*le*) liang fu shoutao. (Achievement, completion)
He lose LE two CL. Glove.
He lost two pairs of gloves.
b. Ta xie *(*le)* san feng xin. (Accomplishment, completion)
He write LE three CL letter.
He wrote three letters.

English:

(30) a. Zachary arrived. (Achievement, completion) (Gabriele 2005, 32)
b. Mrs. Ramsey wrote a letter. (Accomplishment, completion) (Smith 1997, 170)

Thirdly, when English past tense combines with activities and statives, it shows different patterns with Chinese verbal *le*. When the verbal *le* combines with activities and statives, which indicate endpoints by taking temporal boundaries, it means the termination of the event, which is same as the combination of the past tense and activities or statives in English. The verbal *le* shows the perfective function.

Chinese:

(31) a. Ta gai *le* liang nian de fangzi. (Activity, termination)
He build LE two year DE house.
He built house for two years.
b. Liming ai *le* Xiaojuan shi nian. (Stative, termination)
Liming love LE Xiaojuan ten year
Liming loved Xiaojuan for ten years

English:

(32) a. Lily swam in the pond. (Activity, termination) (Smith 1997, 170)
b. John lived in London. (Stative, termination) (Comrie1985, 40)

However, when the verbal *le* combines with some activities and statives, which don't have endpoints even by taking certain boundaries, it encodes on-going situations. The verbal *le* shows the imperfective function and is different from English past tense. For example,

(33) Chinese:

a. Ta yang *le* yi tiao yu. (Activity, on-going)
He raise LE one CL fish.
He raises a fish.

b. Men wai zhan *(*le)* yi ge ren. (Stative, on-going)
Door outside stand LE one CL man.
There is a man standing outside the door.

English:

a. He raised a fish. (Activity, terminated)
b. There was one person standing outside the door. (Stative, terminated)

The examples above show that the difference between the verbal *le* and the English past tense when they combine with some activities and statives. The verbal *le* shows the imperfective function instead of the perfective function.

The prediction is that if learners transfer the English *–ed* to Chinese verbal *le*, English learners would correctly comprehend the combination of verbal *le* and activities or statives which have end points by taking temporal boundaries correctly as perfective. However, they would uncorrectly comprehend the combination of the verbal *le* and activities or statives such as “ta yang *le* liang tiao gou (he raises two dogs)” and “wenwai zhan *le* san ge ren (there are three persons outside the door)” as the perfective events.

Table 4. The aspect properties of verbal *le* & English past tense (the main differences are highlighted in the bold letters)

		Chinese Verbal *le*	English past tense
Telic events	ACH	Perfective	Perfective
	ACC	Perfective	Perfective
	ACT &STA (containing the end point by taking certain boundary)	Perfective	Perfective
Atelic events	ACT &STA (no end point even taking certain boundary)	**Imperfective**	**PERFECTIVE**

In my study, I will focus on the interaction of *le* and accomplishments/achievements, and the acitivities/statives which do not indicate the end points event taking certain boundaries.

Fourthly, English tense is explicitly expressed by tense markers; English native speakers do not need to deduce tense from other contexts. However, Chinese tense needs to be deduced from other contexts in some situation. For example, the tense of the first event needs to be deduced from the tense of the second event in sentences (34) with two successive events.

(34) a. Gege mai *le* fangzi cai jie *le* hun. (Past)
Brother buy LE house then get LE married.
My brother got married after he bought his house.

b. Gege mai *le* fangzi yihou zai jiehun. (Future)
Brother buy LE house after then get married.
My brother will get married after he buys the house.

For these two sentences, the first events “buy a house” are exactly same literally, but they indicate different tense due to the tense of the second event. The tense of second event in sentence (a) defaults past tense, so the first event in sentence (a) is also past tense. The tense of second event in sentence (b) defaults future tense, so the second event in sentence (b) is also future tense. Due to the lack of the deduction in English tense, we predict that English native speakers will performed poorly on the sentences which the tense needs to be deduced from other contexts.

3. Previous research on first and second language acquisition of *le*

There are two lines of research about temporal acquisition: form-oriented studies and meaning-oriented studies (Bardovi-Harlig 1999). The form-oriented studies (also known as form-to-function studies) focus on how and where a particular form is used by learners; the meaning-oriented studies (also known as the concept-oriented studies) focus on how a particular concept is expressed. So far most studies (Sun 1993, Wen 1995, Huang 1998, etc.) about Chinese aspect markers have adopted the form-oriented approach. As for the form-oriented approach, an enormous amount of research about L1 and L2 learners acquiring situation aspect and viewpoint aspect and the interaction between them provides support for the Aspect Hypothesis (Bloom

et al., 1980; Andersen and Shirai 1994). The Aspect Hypothesis proposes that first and second language learners will be influenced by the inherent lexical aspect of verbs when they acquire tense-aspect morphology. For example, learners first use past tense or perfective markers on achievements and accomplishments, then extend to activities and statives; imperfective markers first are used with activities and statives, then extent to achievements and accomplishments. This hypothesis predicts that past or perfective makers would appear with telic verbs and imperfective marker would appear with atelic verbs in learners' early acquisition. Research in the acquisition of aspect in L1 and L2 Chinese has been sparse; few studies follow the route of the interaction of lexical aspect and grammatical aspect; no research touches the question of the processing of aspect markers. In this chapter, I review the literature reviews focusing on the acquisition of *le.*

3.1 Previous Research of first language acquisition of Chinese aspect *le*: Aspect Hypothesis

The L1 acquisition studies of Chinese aspect conducted by Erbaugh (1992) and Kong (1993) show that the perfective *le* mostly occurs with telic and punctual verbs in children's production. This supports the Aspect Hypothesis. The more comprehensive study conducted by Li (1990) built an important theoretical and empirical foundation for Chinese aspect acquisition. Li conducted three experiments examining children's comprehension, production and imitation of lexical and grammatical aspects in Chinese.

The participants were 135 children aged 4-6 from several kindergartens in Beijing. They were divided into 3 groups of 45 each: 4-year-olds, 5-year-olds and 6-year-olds.

The comprehension task was a sentence-picture matching task. Aspectual distinctions ("*le*", "*zai*" and "*zhe*") were represented by pairs of contrasting picture stories. For example, story (a) expressed by two pictures matched the perfective sentence *wuli de chuanghu kai le* (the window in the room opened); story (b) expressed by two pictures matched the imperfective sentence *wuli de chuanghu kai zhe* (the window in the room is open). Each child heard only two sentences with each pair: the perfective sentence with *le* and its imperfective counterpart with *zai* or *zhe*. Each child was presented with a total of 18 pairs of stories, three for each of the six verb types: activity, semelfactive, accomplishment resultative verbs, accomplishment locative verbs, mixed telic-stative verbs and statives. The results show that children understand the progressive marker *zai* better with atelic verbs (activity and semelfactive) and perfective marker *le* better with telic[2] (accomplishment) verbs. Li argued that the lexical aspect of verbs plays a significant role in children's comprehension of grammatical aspect in Chinese. The interaction between grammatical and lexical aspects exists not only in production as observed in English and other languages, but in comprehension as well.

The elicited production test investigated how children use aspect markers with different kinds of verbs. Children described 18 situations enacted with toys. A

[2] He didn't test achievements, because they cannot be combined with the progressive marker *zai* and durative marker *–zhe*.

total of 1007 sentences were collected with aspect markers. The results show that in children's production, children tend to combine achievements and accomplishments with *le*, not with imperfective markers and that children tend to apply the progressive aspect markers to activities.

Finally, they were given a sentence imitation task. The assumption for imitation task is that when the sentence length exceeds the short term memory capacity, "children try to retrieve the meaning of the sentence and filter it through their own productive system"(Li, p120) when they imitate the sentence, which means if the sentence is ungrammatical or odd, children will tend to modify it with their own systems. The prediction is that they will have more difficulty imitating ungrammatical (*zai* with achievements and *zai* with statives) than grammatical (*le* with achievements and *le* with statives) combinations of aspect markers and verbs. The results show that children do have more difficulty imitating ungrammatical combinations (the ungrammatical combination of *zai* with achievements presented a particular imitation difficulty for children), which shows children are sensitive to the resultative meaning of verbs combined with the progressive meaning of *zai*.

In short, studies of first language acquisition show that the lexical aspect of verbs plays a significant role in children's comprehension and production of grammatical aspect in Chinese. All studies show that the combination of *le* with achievements is more favored than other situation types, which supports the Aspect Hypothesis.

3.2 Previous research on second language acquisition of Chinese aspect *le*: Aspect Hypothesis & L1 transfer

3.2.1 Longitudinal studies

In order to investigate how L2 learners acquire *le*, Zhao (1996) longitudinally observed a student M studying Chinese in Beijing for almost two years. The native language of the subject is English and he never studied Chinese before he came to Beijing. The author recorded M about 24 times over the course of two years (after 3-6 months of classes; after 12-14 months of classes; and after 20-22 months of classes). During recording sessions, the author elicited the production of *le* by asking M to retell stories that were presented in videos or pictures. The results show that the big problem for M is oversupplying *le*: from 72% of the first phase (after 3-6 months) to 20% of the third phase (after 20-22 months). The author argued that M transferred the simple past tense of English to Chinese *le* and thought *le* can substitute *–ed* of English. For example,

(1) a.*Wo hen zao jiu dasuan *le* lai zhongguo.
I very early already plan LE come China.
I planed to come to China long time ago.

b. * Wo lai *le* zhongguo yiqian, jiu zhidao zhongguo renkou hen duo.
I come LE China before, already know China population very big.
Before I came to china, I know that the population in China is huge.

The author argued that there is much limitation for perfective marker *le* occurring with completed events. In example (1a), the object is a verb phrase (*lai zhongguo* "to come toChina"), the verb (*dasuan* "plan") generally cannot occur with *le*; in example (1b), the verb cannot appear with *le* when it is within the time adverbial phrase. However, in English, there is no limitation for the *–ed* to occur with completed events. So Zhao proposed that the learner transferred the *–ed* to the verbal *le* and made errors.

3.2.2 Experimental studies

Jin & Hendriks (2003) investigated 30 L2 Chinese learners, 30 L1 Chinese learners and 10 Chinese adults. The L2 learners were all English native speakers who studied Chinese at least 6 months at colleges and were divided into 3 groups according to their scores on a cloze test. L1 learners were also divided into 3 groups according to their ages (5yr; 7yr; 10yr). The Chinese adults were the control group. All of the subjects were asked to describe a story about a horse and a story about a cat based on two sets of picture sequences and the production was recorded.

The results showed that both L1 and L2 Chinese learners in this study behaved more or less in the same way: they used verbal *le* most with achievements and accomplishments, which confirms Aspect Hypothesis. In addition, the results showed that L2 learners had consistent problems overusing and underusing *le*. The author briefly mentioned that the reason for the difficulty is L1 transfer but didn't give any examples in the paper.

3.2.3 Corpus studies

Based on a Chinese interlanguage corpus, Teng (1999) investigated the acquisition of *le* by 9 English native speakers who were beginning level Chinese learners, and who had studied at the Mandarin Training Center for 9 months. He adopted Lü (1980)'s framework for marking *le* sentences in his project. The results show that the beginning learners make the most errors related to the verbal *le*. Secondly, the error is mostly due to L1 transfer of the past tense. For example,

(2) Tamen shuo **le* wode fayin bu tai ziran.
They say LE my pronunciation not very natural.
They said that my pronunciation is not natural.

Example 2 is not possible because when a verb takes a sentence as its object, the verb cannot occur with the verbal *le*, even when the event is completed. "Fine-tuning between Chinese perfectivity and English past tense usually takes more than a couple of years of full-time instruction of Chinese. Thus the error rate of type 1(the verbal *le*) will remain quite high for a number of years" (Teng, 1999, p60).

Based on the interlanguage corpus of 1,300,000-word database collected by Beijing University of Language and Culture, Yang et al (1999) investigated the relationship between the situation aspect and viewpoint aspect and the relationship between syntactic structures and viewpoint aspect. The corpus includes 579 *le* sentences, which were produced by L1 English students who are divided into 8 levels according to their academic semesters. The distribution of error rate in different proficiency levels is shown below (table 5):

Table 5. The distribution of error rate in different proficiency levels

Proficiency level	Total number of *le* sentences	Number of incorrect *le* sentences	Error rate
1	27	7	26%
2	142	39	27%
3	120	22	18%
4	133	36	27%
5	98	21	21%
6	41	7	17%
7	10	2	20%
8	8	1	13%
Total	579	135	23%

The table above shows us that although the beginning error rate is not high, learners did not make obvious progress in using *le* over time. This means *le* is consistently difficult for learners to use appropriately.

The errors of *le* are divided into two types: incorrect aspect and incorrect syntactic structure. For example,

(3) a. * Ta yunxu *le* womende taolun.
He permit LE our discussion.
He permitted us to discuss.

b. * Ta zhan qilai *le* huanying women.
He stand up LE welcome us.
He stood up to welcome us.

The error of the sentence (3a) results from the combination of the stative verb "yunxu (permit)" with perfective marker *le*; the error of the sentence in (3b) results from the syntactic structure of two successive verbs, in which the first verb cannot combine with *le*.

The distribution of *le* in different situation types tells us that *le* mostly occurs with achievements (42%) and accomplishments (33%). Learners make more errors in statives (63%) and activities (21%) due to the aspect. The authors explained the result from two perspectives: one is the Primacy of Aspect Hypothesis; the other is L1 transfer, so learners equal the perfective *le* with the past tense of English and oversupply *le* with statives and activities.

To summarize, because *le* is the most complicated aspect marker in Chinese and there are various and persistent errors in learners' production of *le*, a lot of research has focused on its acquisition. The L1 acquisition research (Erbaugh, 1992; Kong, 1993; Li, 1990) and the L2 acquisition research (Jin& Hendricks, 2003; Yang, 1999) support the Aspect Hypothesis. The research of second language acquisition (Zhao, 1996; Jin & Hendricks, 2003; Teng, 1999; Yang, 1999) proposes that the L1 transfer from the English past tense plays an important role in learner's production errors of *le*.

All the papers focused on learners' production except that Li (1990) conducted a comprehension experiment for L1 learners. The comprehension test in Li focused on distinguishing the perfective marker *le* and the imperfective markers *zai* and *zhe*. He did not address the different interpretation of the verbal *le* interacting with different verbs. Since all previous researchers focused on learners' production data and they did not get the data when *le* occurs in future and present tense, previous research ignored the imperfective function of the verbal *le* and generally took the verbal *le* as a perfective marker. In addition, all previous research didn't distinguish the L1 transfer from the past tense or from the perfective characteristic of English *–ed.* They simply claim the transfer from the English past tense to the aspect marker *le*.

4. Experiment

In my paper, I will focus on the temporal semantic feature of Chinese *le.* In contrast to previous research, I will focus on learner's comprehension. By investigating the interpretation and processing of the verbal *le*, I want to contribute to the question of how learners understand the aspect marker *le* in sentences. My research questions are whether there is L1 transfer from English suffix *-ed* to Chinese aspect marker *le* in English native speakers' comprehension and whether leaner's' interpretation and processing of the temporal information indicated by *le* is affected by other factors such as other contexts and temporal words. By the

experimental approach, we can systematically investigate the interpretation of *le* sentences.

4.1 Introduction

According to the literature review above, many researchers have argued that there is L1 transfer from the English past tense to the Chinese verbal *le* in their production, and the verbal *le* is a difficult point for learners to use correctly. In learner's production, many factors such as the complicated prosodic, syntactic, semantic and pragmatic features of the particle *le* can cause errors. In order to clearly understand these errors, we need to tease apart these factors. This cannot be done by looking only at production data. Also based on the corpus study of Zhao & Shen (1984), which verifies the following point: 67% of 709 sentences that have the verbal *le* are translated into English past tense; 11% are translated into present tense and 2.5% are translated into future tense (others include 17% translated into the perfect tense, and into participle, infinitive, noun), the aspect marker verbal *le* is used mostly to describe past events. The function of *le* occurring in future and present tense may not be shown in learners' production data, so previous researchers ignore these functions of *le* and get biased claim. By the experimental method, we can eliminates other factors and systematically investigate learners' comprehension of the verbal *le*. In this paper, I conduct two experiments to investigate how English native speakers interpret and process the verbal *le*.

The first task is grammaticality judgment test; the second task is a timed interpretation test. The grammaticality judgment test is a kind of screening test, which tests whether learners simply map the English past tense onto the Chinese verbal *le*. If they do map the past tense *-ed* onto the verbal *le*, we will not include their data; if they don't, we will analyze their data of the interpretation test. The point of the interpretation test is to probe to what extent learners interpret "*le*" correctly across a range of three different contexts: single event sentences, two event sentences and sentences with temporal words.

4.2 Method

Participants are 9 English learners of Chinese studying at East-Asian department and taking regular language classes (about 5 hours per week). They are level 3 students and have learned Chinese about 20 months. I had planned to test level 2 students as well who have learned Chinese for 11 months, but due to their poor vocabulary (especially for the test verb – activities), I had to give up testing them. I also tested 9 Chinese native speakers as a control group for controlling of the correct rate. They were all paid for this experiment.

Procedure: The subjects were investigated individually. Learners first filled out a language background questionnaire, and then read a word list to make sure that they know all the words in the test sentences. After that they did the Grammaticality Judgment test on paper and did the interpretation test on a computer like native speakers. They were told to pretend to chat with a new Chinese friend on-line during

the interpretation tests on the computer. The target sentences and the interpretation sentences were given visually on the computer at the same time. Subjects were asked to use the left button of the mouse to choose the right interpretation from two choices on the screen as quickly as possible. The reaction time was collected by Paradigm and the timing was from the sentences shown on the screen to their pressing the button.

4.3 Grammaticality Judgment test (GJ)

The question for the GJ test is whether L2 learners treat the verbal *le* as a past tense marker as in English. The difference between the past tense *–end* and the perfective marker is that the past tense can only describe past events and the perfective marker can describe events in any tense. So the main purpose is to test whether learners know that the verbal *le* can co-occur with non-past tense temporal words. If they know it, it means they regard the verbal *le* as a perfective marker.

The Grammaticality Judgment test includes 8 pairs of sentences (2 pairs of sentences from each verb type), which are all grammatical and 16 fillers that are all ungrammatical. The 32 sentences are pseudo-randomized. Half of the target sentences contain the verbal *le* and the past temporal words such as *yesterday, last year*; half of the sentences contain the verbal *le* and the non-past temporal words such as *tomorrow, now, next year*. The English past tense can only describe the past event and cannot occur with the non-past temporal words, while the Chinese verbal *le* can describe any tense event and can occur in any tense. So if the previous claim

that there is L1 transfer from the English past tense to the verbal *le* is right, learners would consider the combination of the verbal *le* and the non-past temporal words as ungrammatical and the combination of the verbal *le* and the past temporal words as grammatical. All test sentences are as simple as possible (such as words, structure) to avoid other factors influencing the grammaticality judgment. 16 fillers exhibit ungrammatical word order such as the reversal of the verb and the object, the wrong position of the adverb and the reversal of the preposition and the object, the reversal of the numeral and noun, etc. The test examples are as follows:

(1) A. 明天他写了三封信才去公园。
Mingtian ta xie *le* san feng xin cai qu gongyuan.
Tomorrow he write LE three CL letter then go park.
Tomorrow he will go to the park after he finishes three letters.

B. 昨天他写了三封信。
Zuotian ta xie *le* san feng xin.
Yesterday he write LE three CL letter
Yesterday he wrote three letters.

4.4 Interpretation test

If learners do not map the verbal *le* onto the past tense in the Grammaticality Judgment test, the interpretation test is necessary for further study. In the interpretation test, I put *le* in three different contexts. My question is how they interpret the verbal *le*, whether they know the specific interaction between the verbal *le* and the verb classes, whether other contexts such as sentences with two events and temporal words affect their interpretation and processing.

There are three tests in the interpretation test. In order to make the test sentences more variable, these three tests are mixed together and randomized by the software "Paradigm" during the test. We have 64 test sentences and 24 fillers for interpretation tests. The first test is to test whether learners transfer the perfective function of English *–ed* to the Chinese verbal *le* and whether learners know specific interaction between the verbal *le* and the lexical aspectual classes. These sentences are single event sentences and do not include adverbials. When English suffix *–ed* combines with any verb, it always encodes perfectivity and past tense. On the other hand, the Chinese verbal *le* interacts differently with different verb classes. The combination of *le* and achievements and accomplishments shows perfective function and defaults past tense but the combination of *le* and some activities and statives shows imperfective function and defaults present tense. So it is an interesting point to investigate the interpretation of *le* and four verb classes by English learners. We predict that due to the different function of the verbal *le* and English *–ed* for activities/statives, learners will interpret *le* as perfective marker and do poorly on activities/statives and very well on accomplishments/ achievements.

The second interpretation task is to test the integration of temporal information indicated by *le* in sentences with two events and the sentence processing. Based on the prediction of first interpretation test that learners will performed very well for the interaction of accomplishments/achievements and *le*, in this task, I want to test whether learners can correctly integrate the temporal information in complex contexts for the interaction. Test sentences include two successive events and the

verbs are all achievements and accomplishments. We predict learners will have difficulties with the complex context. Also, half of sentences encode past tense and half of them encode future tense. We predict that learners will process the sentence more quickly when the verbal *le* is in the past tense than in the future tense since the consistent temporal information for the first and second events.

The third interpretation task is to test whether adverbials help learners comprehend the verbal *le* better. We mentioned before that at the sentence level, Chinese language can use the indirect way aspect markers to default tense when there are no temporal words and other contexts. It also can use the direct way --- temporal words to explicitly express tense. In the first and second tests, I only test the interpretation of temporal information indicated by the indirect way; I want to know whether or not the direct way can help them in interpreting and processing. I put adverbials in sentences which we predict that learners will have problems to interpret in the first and second interpretation tests. Since the adverbials give a clear clue for the tense, we predict they can interpret the interaction of the verbal *le* and verbs better and process the sentences faster with the help of adverbials. First, by comparing past with future sentences in test 3, we can see whether parsers can comprehend the temporal meaning more quickly when the verbal *le* is in the past tense than in the future tense. We compare test 1 and test 3 to see whether learners comprehend the verbal *le* better when there are adverbials in the sentences. By comparing test 2 and test 3, we can see whether learners process the sentences faster with the help of adverbials.

Fillers are simplest sentences to test whether subjects pay attention to the tests. Other aspect markers such as *zhe, zai, guo* show in some simple sentences. Some fillers just test the object difference such as *cake* vs. *pie* and number difference such as *2* vs. *3*. Test examples are as follows.

(2) A. “我买了两本书”。
Wo mai *le* liang ben shu.
I buy LE two CL book
I bought two books.

a. I bought 3 books.
b. I bought 2 books.

B. “妈妈做了一个蛋糕”。
Mama zuo *le* yi ge dangao.
Mom make LE one CL cake.
Mom made a cake.

a. Mom made a cake.
b. Mom made a pie.

C. “孩子们在公园里唱歌”
Haizi-men zai gongyuan li changge.
Child-pl. ZAI park in sing
Children are singing in the park.

a. The children are singing in the park.
b. The children will sing in the park.

D. “我看过很多美国电影”
Wo kan guo henduo meiguo dianying.
I watch GUO many America movie
I watched a lot of American movies.

a. I will watch a lot of American movies.
b. I watched a lot of American movies.

The details for each test are as follows.

4.4.1 Experiment 1

The aspect markers in Chinese play an important role in tense expression. When there are no temporal words and no other context, the verbal *le* can show perfective and imperfective function and indicate past or present tense depending on interaction with telic or atelic events as we discussed in section 2.3. In English, the –*ed* is both the past tense marker and the perfective marker. It always shows perfective function and implies an endpoint no matter what kinds of verbs it combines as we discussed in section 2.4.

The question for experiment 1 is whether there is L1 transfer from the perfective function of English -*ed* to the Chinese verbal *le*. If learners transfer the English perfective function of the –*ed* to the verbal *le*, they would have some problems understanding the verbal *le* when it combines with activities and statives which do not indicate endpoints even by taking certain boundaries. So the result would show different for different verb types.

There are four sentences for each verb class, 16 sentences in total. The tense of the sentences are all the default tense of the verbal *le*, which means the sentences are without the temporal verbs and other context. In experiment 1, I only chose the activities and statives which indicate on-going situations such as “yang (raise), bao (hold), gua (hang)”. These verbs combined with the verbal *le* show a different temporal meaning from they combined with the English suffix –*ed*. So in

experiment 1, for achievements and accomplishments, all the sentences with the verbal *le* indicate the completion of the event and the past tense; for activities and statives, the sentences with the verbal *le* indicate the on-going situations and present tense. The subjects were presented with target sentences in Chinese. They were also presented with two interpretation sentences in English for each target Chinese sentence and were asked to indicate which sentence in English presents the correct interpretation of the target Chinese sentence. For achievements and accomplishments, we chose the past and the future for the pair of interpretation sentences. Firstly, because when they are combined with the verbal *le*, they can only express past and future tenses; secondly, because we wanted to test whether there is transfer from the English past tense to the verbal *le*, we chose the past tense as one of the interpretation sentences; thirdly, achievements do not naturally combine with present tense in English, for example “?he finds a book”, “ ?he is finding a book”, “?he loses a book”, “?he is losing a book”. For activities, we chose the present progressive and the past for the pair of interpretation sentences. Firstly, because the default tense of the combination of the verbal *le* and activities is present progressive; secondly, because we wanted to test whether there is transfer from the English past tense to the verbal *le*. For statives, we chose the present and the past for the pair of interpretation sentences. The reasons are the same as activities: the default and the test goal. The interpretation sentences were set up so that they would get “a” responses and “b” responses equally. The test examples are as follows:

(2) A. “我在飞机上认出了老朋友”。 (Achievement, past)
Wo zai feiji shang renchu *le* lao pengyou.
I on airplane on recognize LE old friend
I recognized an old friend on the airplane.

a. I recognized an old friend.
b. I will recognize an old friend.

B. “我爸爸盖了一座房子”。 (Accomplishment, past)
Wo baba gai *le* yi zuo fangzi.
I dad build LE one CL house.
My dad built a house.

a. My dad built a house.
b. My dad will build a house.

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C. “他手里推了一辆车”。
Ta shou li tui *le* yi liang che. (Activity, present)
He hand in push LE one CL cart.
He is pushing a cart.

a. He pushed a cart.
b. He is pushing a cart.

D. “我家门外站了三个人”。 (Stative, present)
Wo jia men wai zhan *le* san ge ren.
I house door outside stand LE three CL person.
There are three people standing outside the door.

a. There were three people outside the door.
b. There are three people outside the door.

4.4.2 Experiment 2

Based on the prediction of the first interpretation test, we predict that the learners will perform very well on the interaction of accomplishments/achievements and *le*. The questions we wanted to investigate were whether learners can integrate temporal information of the interaction correctly when it is in complex context i.e.

sentences with two successive events; whether they can comprehend the temporal meaning more quickly when the verbal *le* is in the past tense than in the future tense. The two successive events can change the default of the verbal *le* and make the verbal *le* be interpreted in future tense.

In the sentences with two successive events, the tense of the first event depends on the tense of the second event. The second event with or without the verbal *le* can decide the tense of the first event. When the verb of the second event is without the verbal *le*, it means the second event does not happen, and the first event also does not happen, so the tense is future tense. For example,

(3) A.他死了以后捐献眼睛.
Ta si *le* yihou juanxian yanjing.
He die LE after donate eye.
He will donate his eyes after he dies.

The second event in (3A) “donate eyes” is in the future tense due to the absence of the verbal *le* in the second event, so the first event “die” also doesn’t happen and is a future event.

When the verb of the second event is with the verbal *le*, it means the second event already happened and the first event is already completed or terminated, so the tense is past tense. For example,

B. 他死了以后捐献了眼睛。
Ta si *le* yihou juanxian *le* yanjing.
He die LE after donate LE eye.
He donated his eyes after he died.

The second event in (3B) “donate eyes” already happened and is in the past tense due to the present of the verbal *le* in the second event, so the first event “die” also happened and is a past event. We put the first event in past or future tense by controlling the second event, which is the difference between each pair of sentences. Also, usually the conjunction of two successive events is “cai (then)” and “zai (then)”. “Cai” naturally occurs in past tense[3]; “zai” more naturally occurs in future tense. The prediction is that learners will have difficulties to integrate the temporal information due to the lack of this kind of deduction in English tense; if they can handle the integration, they would do better job for the past tense than future tense and would need more time to get correct answers for the sentences in which the verbal *le* occurs in future tense events. The reason is as follows: for the past tense, both the first and second events default the past tense and it is easier to get the past temporal interpretation for the first event; however, for the future tense, the first event defaults the past tense, whereas the second event defaults future tense, so they need to go back to revise the temporal interpretation and get future tense for the first event, which would bring more difficulty and make them take longer to process the future sentences.

There are eight pairs of sentences. Two sentences in each pair are almost completely the same except for the verb of the second event with or without *le* and the conjunction words. In this test I only test achievements and accomplishments. Since the default tense of these verbs is consistent with the English *–ed,* we predict

[3] “cai” also can occur in future tense for two events, but the relation of the two events is conditional instead of successive.

that learners should not have problems to interpret the interaction of the verbal *le* and achievements/ accomplishments. Half of the target sentences with the verbal *le* are interpreted as past tense; the other half of the sentences with the verbal *le* is interpreted as future tense. Two sentences in each target pair are almost completely the same (the same length, the same word categories, the same difficulties). The set-up is the same as test 1. After each target sentence is given in Chinese, two interpretation sentences are given in English. The two interpretations are given in past and future tense of the target verb respectively. I need to mention one point: for some verbs I use "finish + target verb" to emphasize the endpoint in the past and future interpretation sentences. For example:

(4) A. 他写了两封信以后才去了公园。 (Past)
Ta xie *le* liang geng xin yihou cai qu *le* gongyuan.
He write LE two CL letter after then go LE park.
He went to a park after he wrote two letters.

a. He finished writing the letters.
b. He will finish the letters.

B. 他写了两封信以后再去公园。 (Future)
Ta xie *le* liang feng xin yihou zai qu gongyuan.
He write LE two CL letter after then go park.
He will go to a park after he writes two letters.

a. He finished writing the letters.
b. He will finish the letters.

The interest in the first event in example (4B) is whether he finished the letter, not whether he started. So in the interpretation sentence I use "finish writing". For other verbs, we just use the verb itself shown in past or future. For example,

(5) A.他买了房子以后才结了婚。 (Past)

Ta mai *le* fangzi cai jie *le* hun.
He buy LE house then get LE married.
He got married after he bought his house.

a. He bought a house.
b. He will buy a house.

B.他买了房子以后再结婚。 (Future)

Ta mai *le* fangzi yihou zai jiehun.
He buy LE house after then get married.
He will get married after he buys the house.

a. He bought a house.
b. He will buy a house.

The interpretation sentences are set up so that half of sentences should get "a" responses while the other half should get "b" responses.

4.4.3 Experiment 3

We predict learners will have problems for the interaction of activities/statives and *le* in the first interpretation test, since the verbal *le* shows imperfective function but English *–ed* shows perfective function; also they will have problems for sentences with two events in the second interpretation test due to the complex context. In test 3, we put adverbials before the sentences on which we predict that learners will perform badly. The question that we want to investigate is whether they do a better job on interpretation and processing when adverbial time words show up. The temporal words tell learners clearly whether the verbal *le* occurs

in future, present or past events for activities and statives: present temporal words such as “xianzai (now)” indicate the present tense; past temporal words such as “zuotian (yesterday) and qunian (last year)” indicate past tense; future temporal words such as “mingtian (tomorrow) and mingnian (next year)” indicate future tense, so we expect learners will do a much better job on test 3 than on test 1 & 2. If the adverbials help learners a lot to comprehend the verbal *le* correctly, I do not expect a different result for different verb types.

There are 4 pairs of sentences for each verb type, 32 sentences total. The sentences for achievements and accomplishments include two successive events such as in test 2; the sentences for activities and statives include one event such as in test 1. Half of the target sentences contain the verbal *le* and the past temporal words such as yesterday and last year; the other half of the sentences contain the verbal *le* and the non-past temporal words. The test examples are as follows:

(6) A1. “昨天，雨停了我才出去”。 (Achievement, past)
Zuotian, yu ting *le* wo cai chuqu.
Yesterday, rain stop LE I then go out.
Yesterday, I went out after the rain stopped.
a. The rain stopped.
b. The rain will stop.

A2. “明天，雨停了我再出去”。 (Achievement, future)
Mingtian, yu ting *le* wo zai chuqu.
Tomorrow, rain stop LE I then go out.
Tomorrow, I will go out after the rain stops.
a. The rain stopped.
b. The rain will stop.

B1. “昨天晚上，我听了那个故事才睡觉”。 (Accomplishment, past)
Zuotian wanshang, wo ting *le* na ge gushi cai shuijiao.
Last night, I listen LE that CL story then sleep.
Last night I went to bed after I listened to that story.
a. I listened to the story.
b. I will listen to the story.

B2. “明天晚上，我听了那个故事才睡觉”。 (Accomplishment, future)
Mingtian wanshang, wo ting *le* na ge gushi cai shuijiao.
Tomorrow night, I listen LE that CL story then sleep.
Tomorrow night I will go to bed after I listen to that story.
a. I listened to the story.
b. I will listen to the story.

C1. “昨天，弟弟手里推了一辆车”。 (Activity, past)
Zuotian, didi shouli tui *le* yi liang che.
Yesterday, brother hand in push LE one CL cart.
Yesterday, my brother pushed a cart.
a. My brother pushed a cart.
b. My brother is pushing a cart.

C2. “现在，弟弟手里推了一辆车”。 (Activity, present)
Xianzai, didi shouli tui *le* yi liang che.
Now, brother hand in push LE one CL cart.
Now, my brother is pushing a cart.
a. My brother pushed a cart.
b. My brother is pushing a cart.

D1. “现在，我的桌子上放了两本书”。 (Stative, present)
Xianzai, Wo de zuozi shang fang *le* liang ben shu.
Now, I DE table on put LE two Cl book.
There are two books on the table now.
a. There were two books on the table.
b. There are two books on the table.

D2. “昨天，我的桌子上放了两本书”。 (Stative, past)
Zuotian, wo de zuozi shang fang *le* liang ben shu.
Yesterday, I DE table on put LE two Cl book.
There were two books on the table yesterday.
a. There were two books on the table.
b. There are two books on the table.

By the comparison of the result of test 1 and test 2 with test 3 respectively, we can get whether the adverbials help learners to understand the temporal meaning of the verbal *le*.

Moreover, I need to point out that the activities such as “zu (rent) and yang (raise)” and statives such as “zuo (sit) and gua (hang)” combined with the past temporal words can mean the termination of the event and also can mean that the event is still on-going:

(7).去年， 他租了一个房子。
Qunian, ta zu *le* yi ge fangzi.
Last year, he rent LE one CL house.
Last year, he rented a house.
A. He rented the house. (Preferred by NS)
B. He is renting the house.

For example the sentence in (10) can mean both “he rented the house last year” and “he is still renting the house”, but for native speakers, they prefer the former interpretation.

5. Results

5.1 Grammaticality Judgment Test (GJ)

The goal of grammaticality judgment (GJ) test is to test whether learners interpret the verbal *le* as a past tense marker. If learners interpret the verbal *le* only as a past tense marker, we will not consider their data for the interpretation test. The result showed that two learners correctly interpreted all of the eight sentences as

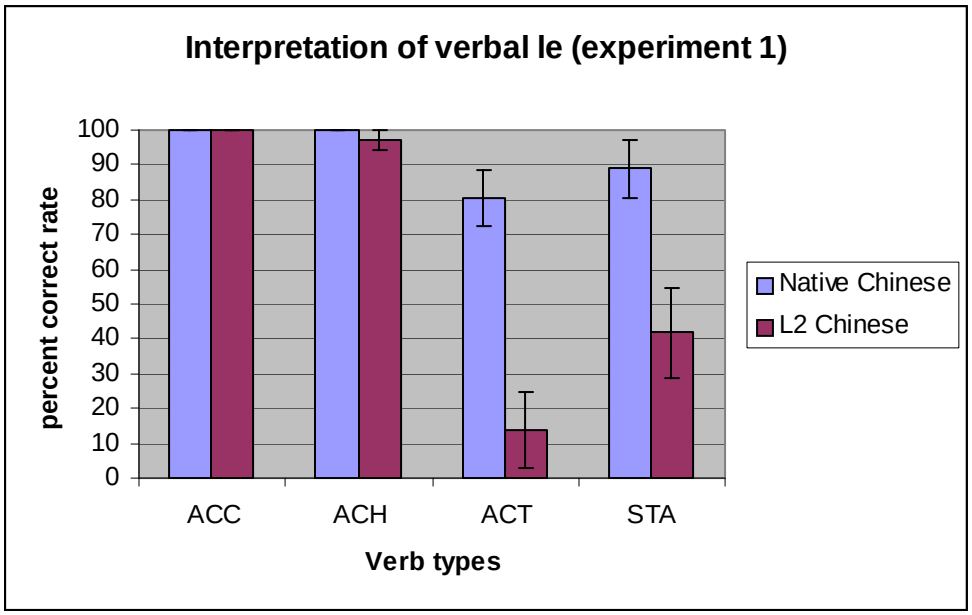
grammatical; three learners made one error on these eight sentences; four learners made two errors on these eight sentences. This tells us that learners performed well on the GJ test and understood that the verbal *le* is not a past tense marker. Therefore, all learners were included in the analyses for the interpretation task.

5.2 Interpretation Test

5.2.1 Experiment 1

The goal for experiment 1 is to test whether learners can interpret correctly the interaction of *le* and four types of verbs without other temporal information; I will refer to this as the default form in this paper. We predict that learners will perform well on accomplishments and achievements but will have difficulty on activities and statives, because the combination of the verbal *le* and activities and statives are interpreted as present tense, which is different from the combination of English –ed with these verbs. There are 16 sentences in experiment 1 and each verb type has 4 sentences. The correct rates for the learners and native speakers are summarized in Figure 1.

Figure 1: the interpretation of the verbal *le* combining with four verb types



From these results in Figure 1, we can see that learners performed well on accomplishments (100%) and achievements (97.22%, 2.78 (std. error)). However, learners had difficulty on activities (13.893%, 11.11(std. error)) and statives (41.67%, 13.176 (std. error)). Only one learner consistently interpreted the combination of verbal *le* with activities or statives as present tense and three learners interpreted some of the combination of the verbal *le* with statives as present tense.

Results of a repeated-measure ANOVA indicated that there was a significant effect for verb type ($F(3, 48) = 30.708$, $p < .01$) and a significant interaction between verb type and subject type ($F(3, 48) = 12.477$, $p < .01$). Post hoc comparisons showed that performance on accomplishments was not significantly different from

performance on achievements (p=1.000) and performance on activities was not significantly different from performance on statives (p=.074). However, performance on accomplishments is significantly different from activities (p=.000) and statives (p=.002); and performance on achievements is also significantly different from activities (p=.000) & and statives (p=.005). In order to look in detail between the four verbs for different subjects, I run repeated measures ANOVA for learners and for native speakers independently. The result shows that for learners the performance on four verb types was the same pattern as described. However, for native speakers, they treat all of the verbs the same.

In addition, I used independent t-test to test whether there is significant difference between learners and NS for each verb type. The test variable is the verb type; the grouping variable is subject type (learner or native speaker). For accomplishments, the correct rate for both learners and native speaker are 100%, so there is no difference for accomplishments. For achievements, the difference is not significantly different ($t(16) = -1.000$, $p > .05$), but the correct rate between learners and NS make directly clear that natives performed significantly better on activities ($t(16) = -4.849$, $p = < .01$) and statives ($t(16) = -3.017$, $p < .01$) than learners.

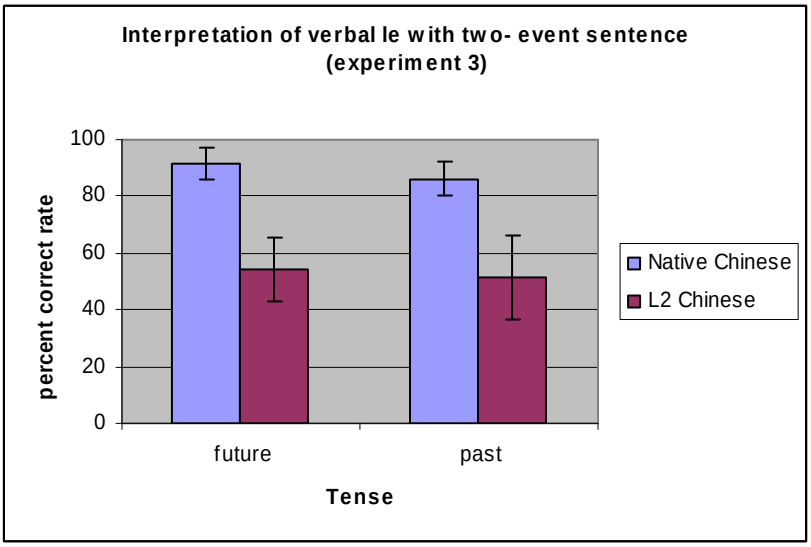
In short, the main results of experiment 1, as predicted, tell us that learners have difficulty to interpret the combination of verbal *le* with activities and statives as present tense. These results suggest that learners interpret *le* as consistently perfective.

5.2.2 Experiment 2

There are two goals in experiment 2: one goal is to test whether learners can correctly integrate the temporal information indicated by the interaction of *le* and accomplishments/ achievements in sentences with two events. The second goal is to test whether learners take longer to process future events than past events. We predict that subjects will take longer to process future events than past events due to the temporal conflict in the first and second events in future sentences. There are 8 pairs of sentences in experiment 2. For each pair of sentences, the length, words, and difficulties are similar; the only difference is that one is future tense and the other is past tense.

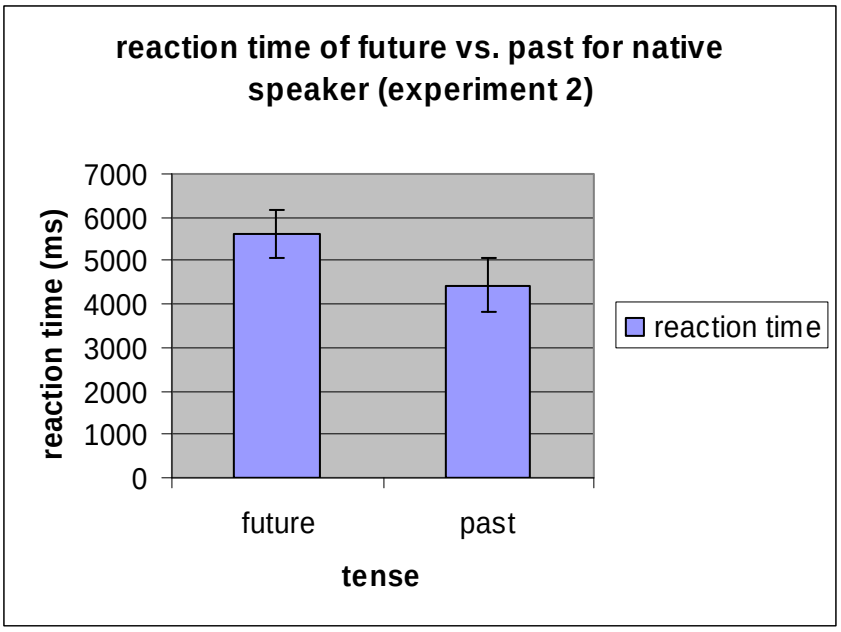
The correct rate and the standard error for native speakers and learners are presented in Figure 2.

Figure 2: The correct rate of native speakers and learners in experiment 2



The results in Figure 2 indicate that learners have difficulty distinguishing the past and future for sentences with two successive events. The correct rates of future events and past events are 54.17% and 51.39% respectively, which is around chance probability (50%, from two choices choosing one). From the individual correct rate, four learners out of nine did badly for both past and future sentences; two did bad job only for past tense; three did bad job only for future tense. Generally, learners cannot distinguish the temporal information for these two sentences. So it is meaningless to calculate the learner's reaction time in experiment 2. The correct rates of native speakers for future and past are 91.67% and 86.11% respectively. We first calculate the average of correct reaction times for all the data of native speakers. The mean reaction time is around 5.8 seconds. We delete the reaction time data that is more than double the average (i. e. more than 12 seconds (4.17%)) for native speakers. The mean and standard error of reaction time for native speakers are presented in figure 3.

Figure 3: Reaction time of future vs. past for NS in experiment 2



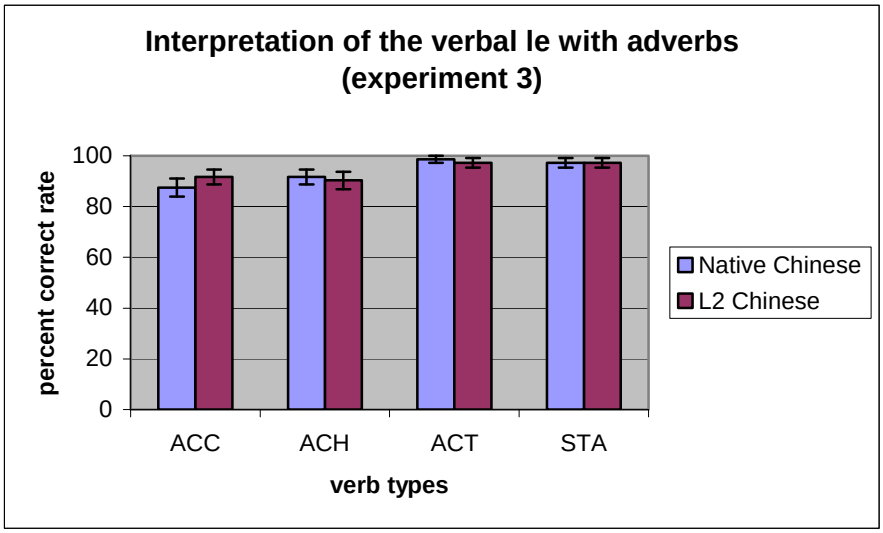
In experiment 2, the mean of reaction time for future events is 5622.78ms and the standard error is 538.96; the mean for past events is 4422.66 and the standard error is 621.42. The paired t-test shows that the reaction time on future events without temporal adverbs was significantly longer than that on past events ($t(8) = -2.959$, $p < .05$). This suggests that NS need more time to process the sentences when the verbal *le* occurs in future events without temporal adverbs.

5.2.3 Experiment 3

The goal for experiment 3 is to test whether adding a temporal adverb helps the learners to interpret and process *le* in Chinese; whether subjects take longer to interpret future tense than past tense. We predict that learners will perform better

with the help of temporal adverbs. Second, we predict that subjects will take longer to process *le* with future events than past events. The results are shown below.

Figure 4: the interpretation of the verbal *le* combining with 4 verb types with the temporal adverbs



From these results in Figure 4, we can see that learners performed well on the four types of verbs: accomplishments (91.67%, 2.95 (std. error)); achievements (90.28%, 3.47 (std. error)); activities (97.22%, 1.84 (std. error)) and statives (97.22%, 1.84 (std. error)).

Results of a repeated-measure ANOVA indicated that there was a significant effect for verb type ($F(3, 48) = 7.216$, $p < .01$). Post hoc comparisons showed that performance on accomplishments was not significantly different from achievements ($p=1.000$); performance on activities was not significantly different from statives ($p=1.000$); performance on achievements was not significantly different from

activities ($p > .05$) and statives; however, performance on accomplishments was significantly different from activities ($p < .05$) and statives ($p < .05$), which means that the significant effect for verb type is only caused by the correct rate of accomplishments. There was not a significant interaction between verb type and subject type ($F (3, 48) = .688$, $p > .05$), which means that native speakers and learners performed the same by the verb type. Also there was not a significant interaction between tense and verb ($F (3, 48) = 1.712$, $p > .05$), which means that subjects performed the same on each verb type by tense. However, there was a significant interaction between tense and subtype ($F (1, 16) = 8.892$, $p < .01$), which means the performance on tense of native speakers was significantly different from that of learners. Consequently, the interaction of verb, tense, and subtype is significantly different ($F (3, 48) = 5.582$, $p < .05$. In order to look in detail between verbs, tense, and subjects, I run several t-tests.

A paired t-test was run to test whether learners performed better when there were temporal words before activities and statives compared to test 1. The answer is yes. There are significant differences between test 1 and test 3 for activities ($t (8) = -7.698$, $p < .01$) and statives ($t (8) = -4.211$, $p < .01$). Also a paired t-test was run to test whether learners performed better when there were temporal words before sentences with two successive events for achievements and accomplishments. The answer is yes. There are significant difference between the correct rate of sentences with two successive events in test 2 and test 3 for achievements and accomplishments ($t (8) = 5.437$, $p < .01$). This means temporal words help learners

interpret the imperfective function of the verbal *le* for activities and statives and help them understand sentences with two successive events for achievements and accomplishments.

Secondly, I ran a paired t-test to calculate whether the correct rate is significantly different between future events and past events for both learners and NS. There is no significant difference for learners ($t(8) = .286$, $p = .782 > .05$), but surprisingly there is a significant difference for NS ($t(8) = -3.536$, $p = < .01$). I will return to this finding in the Discussion.

As for the reaction time, I ran a paired t-test to compare the reaction time of future and past events for both NS and learners. Since the tense contrast of future to past is only for achievements and accomplishments in experiment 3, we only compare the correct reaction time of future and past for these verbs. We first calculate the average reaction time for all data of learners. The mean reaction time is around 12.5 seconds. We delete the reaction time data that is more than double the average (i. e. more than 12 seconds (0.3%) for native speakers and 25 seconds (2%) for learners). The mean and standard error for native speakers and learners are in table 6.

Table 6: the reaction time of future vs. past for NS and learners in experiment 2

	Native Chinese		L2 Chinese	
	RT (ms)	Std. error	RT (ms)	Std. error
Future	4248	499	10840	1415
Past	3600	433	9883	1025

From this table, we can see that native speakers and learners seem to take longer time to process future events than past events. However, performance on future events with temporal adverbs was not significantly different from performance on past events for both native speakers and learners.

Finally, we ran a paired t-test to examine whether the reaction time for sentences with two successive events in experiment 2 was significantly different from the one in experiment 3 for native speakers. The results showed that the reaction time for two events sentences in experiment 2 for past events was not significantly different from the one in experiment 3; however, for future events, the reaction time in experiment 2 was significantly different from the one in experiment 3 ($t(8) = 4.071$, $p < .01$). since the sentences in experiment 2 and experiment 3 are similar, this result tells us that native speakers depends more on temporal adverbs to interpret the verbal *le* in future events than in past events.

In short, as predicted, with the help of temporal words, there is significant improvement for learners to correctly interpret the imperfective function of the verbal *le* and sentences with two successive events. Native speakers processed the verbal *le* sentences faster for future tense in test 3 than in test 2. However, the reaction time on future events with adverbs is not significantly different on past events with adverbs for both native speakers and learners in this test.

5.2.4 Fillers

The correct rate of 24 fillers is 98.61% for native speakers, 99.53% for learners. This shows that they all paid attention to the test.

6. Discussion

The results of this thesis show several interesting patterns for both learners and native speakers of Chinese. For learners, the most interesting part is on their interpretation of aspect marker *le*. Learners know that the verbal *le* is an aspect marker and default past tense when combined with achievements/ accomplishments, but they have difficulties on integrating the temporal information indicated by *le*. For native speakers, the most interesting part is on their processing of aspect marker *le*. Native speakers process sentences faster when *le* occurs in past tense than it occurs in future tense; however, the processing difference disappears when the temporal words show up. I will address these interesting points in more detail.

The results from the grammaticality judgment test show that all learners accept the co-occurrence of the verbal *le* and the future temporal adverbs, which tells us that learners do not interpret the verbal *le* as English past tense *–ed*. The results in this study go against the claim made by previous researchers as that: there is L1 transfer from English past tense to the verbal *le*. My explanation for this difference is that the previous research focuses only on learner's production. Researchers can rarely get the data that the verbal *le* occurs in future events or present events from learners' production. Since the verbal *le* mostly describe past events (67%, Zhao & Shen 1984). It can describe future events only when it is in some conditions such as co-occurring with future temporal words or occurring in the sentences with multiple events as we can see in interpretation test 2 and test 3. It can describe present events only when it combines with some activities and statives as we can see in interpretation test 1. In addition, the future events and present on-going events expressed by *le* sentences can be substituted by using future temporal words and by using durative marker *zhe* respectively, which are more intuitive for learners to understand than the way using *le*. Even for native speakers, the frequency for *le* occurring in present (11%) and future tense (2%) is very low (Zhao & Shen 1984). These facts mislead researchers into ignoring the future tense and progressive aspect expressed by the verbal *le.* Researchers only focus on the past events expressed by the verbal *le* and get the biased conclusion of the transfer from English past tense to the verbal *le*. Secondly, previous researchers do not distinguish the past tense and

perfective function of *-ed*, which mislead them into generally claiming the transfer from English past tense.

The data of Grammaticality Judgment test suggests that learners do not transfer English past tense to the verbal *le*. Then, how do learners interpret the verbal *le*? From the first interpretation test, the results show that most learners interpret the default form of the verbal *le* as a perfective marker for all verbs. Only one learner consistently interprets the combination of the verbal *le* with activities/statives as present tense. These results are consistent with my prediction: learners will have difficulty interpreting the present tense expressed by the verbal *le* and activities/statives. One possible explanation could be that English *–ed* combined with all kinds of verbs means perfectivity, and learners transfer the perfective characteristics of *–ed* to the verbal *le*, so they also interpret the co-occurrence of the verbal *le* and activities/statives in the default form as perfective. The other explanation could be that the verbal *le* is mostly interpreted as a perfective marker; learners over-generalize the perfectivity to all verbs in test 1. In this study, we cannot decide which explanation is more reasonable. So whether there is L1 transfer from the perfectivity of *–ed* and/or overgeneralization in target language is an open question. It would be interesting to look at L1 acquisition data. In L1 acquisition, there is no L1 transfer. If the L1 acquisition data of the aspect marker *le* also shows this kind of overgeneralization, it would provide some evidence for the second explanation. Unfortunately, no one has yet investigated this question in L1 acquisition.

In the second interpretation test, sentences contain two successive events and the verbs are accomplishments/achievements. In this test, learners cannot distinguish the subtle difference between the two types of sentences. For example:

(1) a. 我吃了午饭以后才去了老师办公室。
Wo chi *le* wufan yihou cai qu *le* laoshi bangongshi.
I eat LE meal after then go LE teacher office.
I went to the teacher's office after lunch.

b. 我吃了午饭以后再去老师办公室”。
Wo chi *le* wufan yihou zai qu laoshi bangongshi.
I eat LE lunch after then go teacher office.
I will go to the teacher's office after lunch.

There is the verbal *le* in the first event of both (1a) and (1b). If there is *le* in the second event, two events are past tense such as (1a); if there is no *le* in the second event, two events are future tense such as (1b). In order to correctly interpret the sentences in test 2 such as (1a) and (1b), subjects need to know: 1. The first event "eat lunch" is perfective due to the combination of *le* and achievements/accomplishments, and the verbal *le* can occur in any tense; 2. The second event "go to teacher's office" is past or not depending on the appearance of *le*: the second event defaults past tense with *le* and future tense without *le;* 3. How to integrate the temporal information of the two events: the temporal reference is decided by the last event in sentences with two successive events; then according to the default tense of the second event, subjects can deduce the tense of the first event: the future tense of the second event means the future tense of the first event; the past tense of the second event means the past tense of the first event. According to the

grammaticality judgment test, learners know that the verbal *le* is an aspect marker and can occur in any tense. Also, according to test 1, learners know that the combination of *le* with achievements/accomplishments without the interaction of other temporal information defaults past tense. So it seems learners acquire the interpretation of combination of *le* with achievements/accomplishments and can handle the first and second steps[4]. The main problem for them is the third step: integrating the temporal information of two events. The first events in sentences with two successive events have the exact same sentences for future and past tense such as the first events of (1a) and (1b), but their tense interpretations are different and are derived from larger sentential context (i.e. the second event). This kind of temporal deduction usually does not happen in English as the temporal interpretation in English is always shown by explicit tense markers. So English native speakers do not know how to make use of the larger sentential context to get the appropriate reading. From this study, we can see that the temporal interpretation of sentences with multiple events is really difficult even for advanced learners. Sorace (2003, 2007) has proposed that this type of complex integration may remain difficult even for near-native speakers. So the further interesting question for this study is whether near-native speakers are ever able to handle this complex integration of syntax, semantics and contextual information. The prediction is near-native speakers can finally acquire the complex integration with enough input. If the final state

[4] They can handle first and second steps at least for past tense events based on the data of GJ test and the first interpretation test. Since we didn't test the interpretation of single event sentence without *le*, we assume that they can also handle the first and second steps for future events.

knowledge of near-native speakers is the same as that of native speakers, the questions are whether they process the knowledge in the same way as native speakers and whether the ability to integrate all kinds of information in sentences in real time is the same as native speakers. The prediction is that even though near-native speakers may process the sentence slower than native speakers generally, they should have the same processing pattern for past and future sentences with two events as native speakers, which is they would take longer to process the future tense than the past tense. These questions, no doubt, will contribute to an understanding of the possibilities and limitations of adult second language acquisition.

In test 3, we add the temporal adverbs to the sentences. As predicted, learners perform at the level of natives. In three interpretation tests, learners do badly on test 1 and test 2 and well on test 3. Why do temporal words help learners so much in the comprehension of Chinese? It is acknowledged that inflectional morphemes of English such as *–ed* and *-s* are consistent problems for Chinese learners to express correctly in their verbal and written English, but they can comprehend them very well, since these morphemes show explicit function and meaning (Xu, 1997). However, Chinese does not have inflectional morphemes and relies more on contextual meaning than Indo-European languages (Xu, 1997). The functional words do not have clear and unique meanings, and their meanings depend more on other context to be interpreted. For example, whether the verbal *le* appears as perfective function or imperfective function depends on the verb combined with it; whether the first event with *le* indicates future or past tense depends on the larger context. This

makes it difficult for L2 learners to interpret these functional morphemes. Therefore, when there is clear information coming out, they will depend on it most and ignore the information that is confusing for them. They are confused by the temporal meaning of the verbal *le* in tests 1 & 2. When the temporal words show up in test 3, which give them a clear picture of the temporal meaning like English tense markers and overwhelm the temporal function of the verbal *le*, they do a much better job. These results suggest that learners of Chinese rely on adverbs to deduce the temporal reference. It may be harder for them to deduce the temporal reference from the context compared to native speakers. This study shows much broader factors of L1 influence in the interpretation of the Chinese aspect marker *le* by English learners instead of a simple transfer from the English past tense to the verbal *le*.

For native speakers, the reaction time on future events is significantly different from that of past events in the second interpretation test. In order to give a tentative explanation, it is useful to look at previous research about sentence processing. According to previous research (Crain & Fodor, 1985; Stowe, 1986; Prather & Swinney, 1988; Nicol & Swinney, 1989), sentence processing is an incrementally step-by-step structure building and the development of the expectation is heavily dependent on syntactic and semantic context. For example, Crain and Fodor (1985) suggest that due to the direction of phrase structure rules: the empty position for Wh-phrase in object position such as in “What is Mary hitting _?”, the processing is more difficult at object NP where a gap is expected to occur. For example,

(1) a. Who had the little girl expected ***us*** to sing those stupid French songs for _ at Christmas?
b. The little girl had expected ***us*** to sing those stupid French songs for Cheryl at Christmas.

People take longer to process “us” in sentence (1a) than in sentence (1b). Since they are directed by the syntactic structures and actively looking to find a place to interpret wh-, also “us” position is the possible position to interpret wh-, they expect a gap instead of “us” at the object “us” position in sentence (1a). This phenomenon is called “filled gap effect”. Semantic structure also shows certain effect on sentence processing. For example Gennari (2004) shows us that the distance of two temporal words in main and subordinate clauses influences the reaction time of the sentence. For example,

(2) a. A police officer informed parents *yesterday* that a student attacked several classmates *last week*…… *(“last week” and “yesterday” are close) (close)*
b. A police officer informed parents *yesterday* that a student attacked several classmates *last month*…… *(“last month” and “yesterday” are distant) (distant)*

The distance between the temporal word “yesterday” in main clause and “last week” in subclause in example (2a) is closer than the distance between the temporal word “yesterday” in main clause and “last month” in subclause in example (2b). The mean reading time of close condition (2a) at the noun position was significantly shorter than distant condition (2b). This shows us that the temporal semantic structure is established on-line and influences the sentence processing. Therefore, the tentative explanation of present study is that since the verbal *le* combining with

achievements/accomplishments default past tense, parsers are more likely to expect a past tense rather than a future tense for the first event that contains *le*. In the phase of two events integration, the expectation mismatches the future indication of the second event in the future tense sentences. So, they take longer to reorganize the semantic information. No doubt, we need further tests such as measuring the self-paced reading time on the explanation. The future interesting question for this study would be whether this slowdown effect that parsers take longer to process the future tense than the past tense in sentences with two events can be found in online parsing task; when/how would the semantics of words like *le* might be used online in order to integrate temporal relation of the two events; when/how would temporal relations and temporal locations be assigned to the events during the process of sentence interpretation.

For native speakers, the difference of reaction time between test 2 and test 3 for the future event sentences shows that native speakers process the sentences more quickly with the help of temporal words. However, for the past events sentences, there is no significant difference between test 2 and test 3 for native speakers. Based on Gennari's study in which the distance of the temporal words between main and subordinate clauses are processed on-line as we discussed above in test 2, the future interesting question is when/how the temporal adverbs are used online in the integration? Also, due to the lack of explicit tense markers in Chinese, the temporal word is the only explicit information for temporal interpretation. This is different

from other languages such as English which has explicit tense morphemes. So, there will be benefits to study the on-line function of temporal adverbs in Chinese.

In addition, a surprising thing in experiment 3 is that there was a significant effect for verb types and a significant interaction between tense, verb, and subject type. The post hoc comparisons show that performance on accomplishments is significantly worse than performance on activities and statives. Looking furthermore, native speakers surprisingly did a worse job than learners on the sentences of future adverbs with accomplishments; the correct rate is 75% for native speakers and 97.22% for learners. This (50% of the errors of native speakers in experiment 3 happened for future accomplishments sentences) can explain why there is a significant effect for verb types and a significant interaction between tense and subtype. This surprising phenomenon can be explained by the pace of the experiment. The test was pretty easy for native speakers; they clicked the mouse quickly and took around ten minutes to finish the 88 sentences. Learners paid attention to each sentence and took around half an hour to finish the 88 sentences. After the test, I asked some native speakers about the sentences on which they made errors during the test, and they gave the correct choice. Moreover, the worse correct rate for accomplishments than for statives and activities in experiment 3 can be explained by the complexity of sentences with two successive events. Due to the constraints for the verbal *le* occurring in the future tense, for experiment 3, we adopted sentences with two successive events for the future tense sentences. So for the accomplishments and achievements, the sentences include two events, which are

more complicated than the activity and stative verb sentences. So native speakers don't have problems with activities and statives but have problems with accomplishments and achievements in fast reading. For both native speakers and learners, the reaction time on future events is not significantly different from the reaction time on past events. It contrasts with the results of experiment 2. These results show the function of the temporal words, which help subjects (native speakers) process more quickly for future tense with the verbal *le*.

A limitation for this study is the small sample size of the learner group. In addition, another problem is that the reaction time of the verbal *le* includes too many things (one target sentence and two interpretation sentences) in the process. Although the reaction times suggest that at some level, some kind of processing is delayed when *le* occurs in future events, we do not know whether/how this effect happens in online parsing tasks or what the role of temporal adverbs is in online integration of temporal relations.

7. Conclusion

This study focuses on the comprehension of the central aspect marker –verbal *le* and both its perfective function and imperfective function, which have not been investigated previously in a controlled, experimental study. Also, I tried to distinguish the L1 transfer from the past tense or from the perfective characteristic of English *–ed*, which was not teased apart in previous research. GJ test shows that there is no L1 transfer from English past tense to the verbal *le* in learners'

comprehension, which goes against the previous claim. Because L2 learners consistently interpret the aspect marker *le* as perfectivity when it combines with all verbs, we suggest there is transfer from the perfective of *–ed* and/or from overgeneralization of target language. Also, the test of the interpretation of the two events sentences shows that this type of complex integration is difficult for L2 learners of Chinese. In English the temporal reference of a given phrase is not context dependent on another phrase in the sentence. Due to the lack of this kind of integration in English, learners of Chinese face a lot of difficulty. We know that it is actually the integration that is difficult because the learners are able to correctly interpret each phrase independently in a single event sentence. However, the explicit temporal adverbs help a lot in learners' interpretation of the verbal *le*. This study shows much broader factors of L1 influence in the interpretation of the Chinese aspect marker *le* by English learners instead of a simple transfer from the English past tense to the verbal *le*. As for the processing of the aspect marker, we only get valuable data from native speakers. Native speakers of Chinese took longer to process the future events than the past events for sentences with the verbal *le* due to the conflict of temporal information in two events. This study supports that the temporal semantic information affect sentence processing. The processing of the aspect marker is a brand new field to be explored and there is a lot of room for development for both native speakers and L2 learners. In short, this study suggests several new directions for the study of Chinese aspect markers. Consequently, my

study will contribute to the understanding of interpretation in second language acquisition as well as semantic processing.

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Appendix I: test sentences

Grammaticality Judgment test: (these sentences are randomized)

Achievements:

(1) a.明天他找到了书才去上课。
Mingtian ta zhaodao *le* shu cai qu shang ke.
Tomorrow he find LE book then go have class.
Tomorrow he will go to class after he finds his book.

b. 去年他找到了妈妈。
Qunian ta zhaodao *le* mama
Last year he find LE mom
Last year he found his mom.

(2) a. 五十年前，他就已经死了。
Wushi nian qian, ta jiu yijing si *le*.
Fifty years ago, he JIU already die LE.
He died fifty years ago.

b. 五十年后，他早已经死了。
Wushi nian hou, ta zao yijing si *le*.
Fifty years later, he early already die LE.
He will have already been dead after fifty years.

Accomplishments:

(3)a. 明天他写了三封信才去公园。
Mingtian ta xie *le* san feng xin cai qu gongyuan.
Tomorrow he write LE three CL letter then go park.
Tomorrow he will go to the park after he writes three letters.

b. 昨天他写了三封信。
Zuotian ta xie *le* san feng xin.
Yesterday he write LE three CL letter
Yesterday he wrote three letters.

(4) a. 上个月，他去了学校才知道结果。
Shanggeyue, ta qu *le* xuexiao cai zhidao jieguo.
Last month, he go LE school then know result.
Last month, he got the result after he went to the school.

b. 下个月，他去了学校才知道结果。
Xiageyue, ta qu *le* xuexiao cai zhidao jieguo.
Next month, he go LE school then know result.
Next month, he will get the result after he goes to the school.

Activities:

(5) a. 明天下午，他游了泳才去买东西。
Mingtian xiawu, ta you *le* yong cai qu mai dongxi.
Tomorrow afternoon, he swim LE swim then go buy stuff.
Tomorrow afternoon, he will go shopping after swimming.

b. 昨天下午，他游了泳才去买东西。
Zuotian xiawu, ta you *le* yong cai qu mai dongxi.
Yesterday afternoon, he swim LE swim then go buy stuff.
Yesterday afternoon, he went shopping after swimming.

(6) a. 上个星期五，他做了蛋糕才去 Party.
Shang xingqiwu, ta zuo *le* dangao cai qu Party.
Last Friday, he make LE cake then go Party.
Last Friday, he went to the party after he made a cake.

b. 下个星期五，他做了蛋糕才去 Party.
Xia xingqiwu, ta zuo *le* dangao cai qu Party.
Next Friday, he make LE cake then go Party.
Next Friday, he will go to the party after he makes a cake.

Statives:

(7) a. 明年，他有了钱才买车。
Mingnian, ta you *le* qian cai mai che.
Next year, he have LE money then buy car.
Next year, he will buy a car after he has money.

b. 去年，他有了钱才买车。
Qunian, ta you *le* qian cai mai che.
Last year, he have LE money then buy car.
Last year, he bought a car after he had money.

(8) a. 下个学期, 图书馆关了我才回家。
Xiage xueqi, tushuguan guan *le* wo cai hui jia.
Next semester, library close LE I then go back home.
Next semester I will go back home after the library is closed.

b. 上个学期，图书馆关了我才回家。
Shangge xueqi, tushuguan guan *le* wo cai hui jia.
Last semester, library close LE I then go back home.
Last semester, I went back home after the library was closed.

Fillers:

1. *他写完了作业今天。 (The reversal of verb and the adverb)
Ta xie wan *le* zuoxie jintian.
He write finish LE homework today.
Today he finished his homework.

2 * 现在，他手里拿了书五本。 (The reverse order of the object and the numeral)
Xianzai, ta shouli na *le* shu wu ben.
Now, he hand hold LE book five CL.
Now, his hands hold five books.

3 *今天下午，他上课了也。 (The wrong position of the adverb)
Jintian xiawu, ta shang ke *le* ye.
Today afternoon, he have class LE too.
This afternoon, he had a class too.

4 *上星期， 我中文课有了。 (The reverse order of verb and the object)
Shang xingqi, wo zhongwen ke you *le*.
Last week, I Chinese language class have LE.
Last week, I had a Chinese language class.

5 *晚饭后，我喜欢水果吃了。 (The reverse order of verb and the object)
Wanfan hou, wo xihuan shuiguo chi *le* .
Dinner after, I like fruit eat LE .
After dinner, I like eating fruit.

6*上个学期，他去常常图书馆了。 (The wrong position of the adverb)
Shang ge xueqi, ta qu changchang tushuguan *le* .
Last CL semester, he go often library LE.
Last semester, he often went to the library.

7 *早上，他吃了饭先。 (The wrong position of the adverb)
Zaoshang, ta chi *le* fan xian.
morning, he eat LE meal first.
In the morning, he ate meal first.

8 *昨天晚上，他教室在看了书。(The reverse order of the preposition and its object)
Zuotian wanshang, ta jiaoshi zai kan *le* shu.
Yesterday night, he classroom at read LE book.
Yesterday night, he read the book at the classroom.

9 *他买了苹果昨天。 (The reversal of verb and the adverb)
Ta mai *le* pingguo zuotian.
He buy LE apple yesterday .
Yesterday he bought apples.

10 *上个月，他北京到了。 (The reverse order of verb and the object)
Shang ge yue, ta Beijing dao *le*.
Last CL month, he Beijing arrive LE.
Last month, he arrived at Beijing.

11 * 我是学生，也。 (The wrong position of the adverb)
Wo shi xuesheng, ye.
I am student too.
I am a student too.

12 * 我打篮球常常。 (The wrong position of the adverb)
Wo da lanqiu changchang.
I play basketball often.
I often play basketball.

13 * 他飞机坐去了中国。 (The reverse order of verb and the object)
Ta feiji zuo qu *le* zhongguo.
He air by go LE China.
He went to China by air.

14 * 他中国在住了五年。 (The reverse order of the preposition and its object)
Ta zhongguo zai zhu *le* wu nian.
He China in live LE five year
He lived in China for five years.

15 * 十点钟，他起床才。 (The wrong position of the adverb)
Shidianzhong, ta qichuang cai.
Ten o'clock, he get up then.
Ten o'clock, he got up.

16 *十岁，他会开车就。 (The wrong position of the adverb)
Shi sui, ta hui kaiche jiu.
Ten years, he can driving then.
He can drive when he was ten.

Interpretation Test: (the three tests are mixed together and sentences are randomized by the computer)

Instruction:

In this experiment we want you to pretend that you are chatting with a new Chinese friend on-line. He is giving you a lot of information, which is shown on the screen in Chinese. We want to see if you can understand what he says. In each test item you will see a Chinese sentence on the top of the screen. Below the Chinese sentence will be two sentences in English.

Your job is to choose the English sentence that best matches the meaning of the Chinese sentence. You should only pick ONE sentence. Choose the correct sentence by clicking the left-button of the mouse.

Test 1:

Achievements :

(1) "我打破了杯子" 。
Wo dapo *le* peizi.
I break LE cup.
I broke the cup.

a. I broke the cup.
b. I will break the cup.

(2) "我丢了一本书"。
Wo diu *le* yi ben shu.
I lose LE one. CL book.
I lost a book.

a. I lost a book.
b. I will lose a book.

(3) "我忘记了那个 phone number"。
Wo wangji *le* na ge phone number.
I forget LE that CL phone number.
I forgot that phone number.

a. **I forgot the phone number.**
b. I will forget the phone number.

(4) “我在飞机上认出了老朋友”。
Wo zai feiji shang renchu *le* lao pengyou.
I on airplane on recognize LE old friend
I recognized an old friend on the airplane.

a. I recognized an old friend.
b. I will recognize an old friend.

Accomplishments:

(1) “我爸爸盖了一座房子”。
Wo baba gai *le* yi zuo fangzi.
I dad build LE one CL house.
My dad built a house.

a. My dad built a house.
c. My dad will build a house.

(2) “我弟弟写了几个字”。
Wo didi xie *le* ji ge zi.
I brother write LE several CL character.
My brother wrote several characters.

a. My brother wrote those characters.
b. My brother will write those characters.

(3) “我读了两本书”。
I du *le* liang ben shu.
I read LE two CL book
I read two books.

a. I read the two books.
b. I will read the two books.

(4) “我弟弟画了一个苹果”。
Wo didi hua *le* yi ge pingguo.
I brother draw LE one CL apple.
My brother drew an apple.

a. My brother drew an apple.
b. My brother will draw an apple.

Activities :

(1) “弟弟手里推了一辆车”。
Didi shou li tui *le* yi liang che.
Brother hand in push LE one CL cart.
My brother is pushing a cart.

a. My brother pushed a cart.
b. My brother is pushing a cart.

(2) “我家里养了两条狗”。
Wo jia li yang *le* liang tiao gou.
I home at raise LE two CL dog.
I am raising two dogs.

a. I raised two dogs.
b. I am raising two dogs.

(3) “我穿了一件红衣服”。
Wo chuan *le* yi jian hong yifu.
I wear LE one CL red clothes.
I wear red clothes.

a. I wore red clothes.
b. I am wearing red clothes.

(4) “弟弟手里抱了一个篮球”。
Didi shou li bao *le* yi ge lanqiu.
Brother hand in hold LE one CL basketball.
My brother is holding a basketball.

a. My brother held a bookbag.
b. My brother is holding a bookbag.

Statives :

(1) “我 家 院子 里 坐 了 三 个 老 人”。
Wo jia yuanzi li zuo *le* san ge lao ren.
I house yard in sit LE three CL old man.
There are three old men sitting in the yard.

a. There were three old men sitting in the yard.
b. There are three old men sitting in the yard.

(2). “我的桌子上放了两本书”。
Wo de zuozi shang fang *le* liang ben shu.
I DET table on be LE two Cl book.
There are two books on my table.

a. There were two books on the table.
b. There are two books on the table.

(3) “我家墙上挂了一幅画”。
Wo jia qiang shang gua *le* yi fu hua.
I house wall on hang LE one CL painting.
There is a painting on the wall.

a. There was a painting on the wall.
b. There is a painting on the wall.

(4) “我家门外站了三个人”。
Wo jia men wai zhan *le* san ge ren.
I house door outside stand LE three CL person.
There are three persons standing outside the door.

a. There were three persons outside the door.
b. There are three persons outside the door.

Test 2:

(1) A. “我到了北京以后先去看了一个朋友”。
Wo dao *le* Beijing yihou xian qu kan *le* yige pengyou.
I get LE Beijing after first go visit LE a friend
I first visited a friend after I got to Beijing.

a. I got to Beijing.
b. I will get to Beijing.

B. “我到了北京以后再去看一个朋友”。
Wo dao *le* Beijing yihou zai qu kan yige pengyou.
I get LE Beijing after then go visit a friend.
I will visit a friend after I get to Beijing.

a. I got to Beijing.
b. I will get to Beijing.

（2）A. “爷爷死了以后才卖了房子”。
Yeye si *le* yihou cai mai *le* fangzi.
Grandpa die LE after then sell LE house.
My grandpa sold his house after he died.

a. My grandpa died.
b. My grandpa will die.

B. “爷爷死了以后再卖 房子”。
Yeye si *le* yihou zai mai fangzi.
Grandpa die LE after then sell house.
My grandpa will sell his house after he dies.

a. My grandpa died.
b. My grandpa will die.

（3）A. “哥哥买了房子以后才结了婚”。
Gege mai *le* fangzi cai jie *le* hun.
Brother buy LE house then get LE married.
My brother got married after he bought his house.

a. My brother bought a house.
b. My brother will buy a house.

B. “哥哥买了房子以后再结婚”。
Gege mai *le* fangzi yihou zai jiehun.
Brother buy LE house after then get married.
My brother will get married after he buys the house.

a. My brother bought a house.
b. My brother will buy a house.

(4) A. “我写了信以后才去了公园”。
Wo xie *le* xin yihou cai qu *le* gongyuan.
I write LE letter after then go LE park.
I went to a park after I wrote the letter.

a. I finished writing the letter.
b. I will finish the letter.

B. “我写了信以后再去公园”。
Wo xie *le* xin yihou zai qu gongyuan.
I write LE letter after then go park.
I will go to a park after I write the letter.

a. I finished writing the letter.
b. I will finish the letter.

(5) A. “我吃了午饭以后再去老师办公室”。
Wo chi *le* wufan yihou zai qu laoshi bangongshi.
I eat LE lunch after then go teacher office.
I will go to the teacher’s office after lunch.

a. I finished eating.
b. I will finish eating.

B. “我吃了午饭以后才去了老师办公室”。
Wo chi *le* wufan yihou cai qu *le* laoshi bangongshi.
I eat LE meal after then go LE teacher office.
I went to the teacher’s office after lunch.

a. I finished eating.
b. I will finish eating.

(6) A. “我学会了开车再去美国”。
Wo xuehui *le* kaiche zai qu meiguo.
I learn-get LE driving then go America.
I will go to America after I know how to drive.

a. I learned how to drive.
b. I will know how to drive.

B. “我学会了开车才去了美国”。
Wo xuehui *le* kaiche cai qu *le* meiguo.
I learn-get LE driving then go LE America.
I went to America after I learned driving.

a. I learned how to drive.
b. I will know how to drive.

(7) A. “我学了 610 课以后再学 700”。
Wo xue *le* 610 ke yihou zai xue 700.
I take LE 610 course after then take 700.
I will take the course 700 after 610.

.

a. I finished the course 610.
b. I will finish the course 610.

B. “我学了 610 课以后才学了 700”。
Wo xue *le* 610 ke yihou cai xue *le* 700.
I take LE 610 course after then take LE 700.
I took the course 700 after the course 610.

a. I finished the course 610.
b. I will finish the course 610.

(8) A. “我卖了旧电脑以后再买新电脑”。
Wo mai *le* jiu diannao yihou zai mai xin diannao.
I sell LE old computer after then buy new computer.
I will buy a new computer after I sell the old computer.

a. I sold the old computer.
b. I will sell the old computer.

B. “我卖了旧电脑以后才买了新电脑”。
Wo mai *le* jiu diannao yihou cai mai *le* xin diannao.
I sell LE old computer after then buy LE new computer.
I bought a new computer after I sold the old computer.

a. I sold the old computer.
b. I will sell the old computer.

Practice examples:

(1)“明天， 我三点钟去打篮球”。
Mingtian, wo sandianzhong qu da lanqiu.
Tomorrow, I 3 o’clock go play basketball.
I will play basketball at 3pm tomorrow.

a. I will play basketball.
b. I played basketball.

(2)“我在床上坐着”。

Wo zai chuang shang zuo zhe.
I on bed on sit Dur.
I am sitting on the bed.

a. I sat on the bed.
b. I am sitting on the bed.

(3)“我要喝水”。

Wo yao he shui.
I want drink water.
I want to drink water.

a. I will drink water.
b. I am drinking water.

(4)“我要买很多苹果去看妈妈”。

Wo mai *le* henduo pingguo qu kan mama.
I buy LE many apple go visit mom.
I will buy a lot of apples to visit my mom.

a. I bought a lot of apples.
b. I will buy a lot of apples.

Test 3:

Achievements:

(1) A. “上个月, 妈妈已经到了 Chicago”。

Shang ge yue, mama yijing dao *le* Chicago.
Last CL month, mom already get LE Chicago.
Last month, my mom had already arrived in Chicago.

a. My mom arrived in Chicago.
b. My mom will arrive in Chicago.

B. “下个月，妈妈已经到了 Chicago”。

Xia ge yue, mama yijing dao *le* Chicago.
Next month, mom already get LE Chicago.
Next month, my mom will have already arrive in Chicago.

a. My mom arrived in Chicago.
b. My mom will arrive in Chicago.

(2) A. “昨天，雨停了我才出去”。
Zuotian, yu ting *le* wo cai chuqu.
Yesterday, rain stop LE I then go out.
Yesterday, I went out after the rain stopped.

a. The rain stopped.
b. The rain will stop.

B. “明天，雨停了我再出去”。
Mingtian, yu ting *le* wo zai chuqu.
Tomorrow, rain stop LE I then go out.
Tomorrow, I will go out after the rain stops.

a. The rain stopped.
b. The rain will stop.

(3) A. “昨天，我做好了米饭才出门”。
Zuotian, wo zuo-hao *le* mifan cai chumen.
Yesterday, I cook-finish LE rice then go out.
Yesterday, I went out after I finished cooking rice.

a. I cooked the rice.
b. I will cook the rice.

B. “明天，我做好了米饭才出门”。
Mingtian, wo zuo hao *le* mifan cai chumen.
Tomorrow, I cook-finish LE rice then go out.
Tomorrow, I will go out after I finish cooking.

a. I cooked the rice.
b. I will cook the rice.

(4) A. “明天， 我看到了礼物才知道那是什么”。
Mingtian, wo kandao *le* liwu cai zhidao na shi shenme.
Tomorrow, I see LE present then know that is what
Tomorrow I will know what that is after I see the present.

a. I saw the present.
b. I will see the present.

B. “昨天，我看到了礼物才知道那是什么”。
Zuotian, wo kandao *le* liwu cai zhidao na shi shenme.
Yesterday, I see LE present then know that is what
Yesterday, I know what that is after I saw the present.

a. I saw the present.
b. I will see the present.

Accomplishments:

(1) A. “昨天我吃了那个 sandwich 才回家”。
Zuotian wo chi *le* nage sandwich cai hui jia.
Yesterday I eat LE that sandwich then go back home.
Yesterday after eating that sandwich, I went back home.

a. I ate the sandwich.
b. I will eat the sandwich.

B. “明天我吃了那个 sandwich 才回家”。
Mingtian wo chi *le* nage sandwich cai hui jia.
Tomorrow I eat LE that sandwich then go back home.
Tomorrow after eating that sandwich, I will go back home.

a. I ate the sandwich.
b. I will eat the sandwich.

(2) A.明天，我做了中文作业以后才去朋友家。
Mingtian, wo zuo *le* zhongwen zuoye yihou cai qu pengyou jia.
Tomorrow, I do LE Chinese homework after then go friend home.
Tomorrow I will go a friend’s house after finishing my Chinese homework.

a. I finished my homework.
b. I will finish my homework.

B. 昨天，我做了中文作业以后才去朋友家。
Zuotian, wo zuo *le* zhongwen zuoye yihou cai qu pengyou jia.
Yesterday, I do LE Chinese homework after then go friend home.
Yesterday I went to a friend’s house after finishing my Chinese homework.

a. I finished my homework.
b. I will finish my homework.

(3) A. “昨天晚上，我听了那个故事才睡觉”。
Zuotian wanshang, wo ting *le* na ge gushi cai shuijiao.
Last night, I listen LE that CL story then sleep.
Last night I went to bed after I listened to that story.

a. I listened to the story.
b. I will listen to the story.

B. “明天晚上，我听了那个故事才睡觉”。
Mingtian wanshang, wo ting *le* na ge gushi cai shuijiao.
Tomorrow night, I listen LE that CL story then sleep.
Tomorrow night I will go to bed after I listen to that story.

a. I listened to the story.
b. I will listen to the story.

(4) A. “明天，我买了那本书才去上课”。
Mingtian, wo mai *le* na ben shu cai qu shangke.
Tomorrow, I buy LE that CL book then go to class.
Tomorrow I will go to class after I buy that book.

a. I bought the book.
b. I will buy the book.

B. “昨天，我买了那本书才去上课”。
Zuotian, wo mai *le* na ben shu cai qu shangke.
Yesterday, I buy LE that CL book then go to class.
Yesterday, I went to class after I bought that book.

a. I bought the book.
b. I will buy the book.

Activity:

(1) A. “昨天，弟弟手里推了一辆车”。
Zuotian, didi shouli tui *le* yi liang che.
Yesterday, brother hand in push LE one CL cart.
Yesterday, my brother pushed a cart.

a. My brother pushed a cart.
b. My brother is pushing a cart.

B. “现在，弟弟手里推了一辆车”。
Xianzai, didi shouli tui *le* yi liang che.
Now, brother hand in push LE one CL cart.
Now, my brother is pushing a cart.

a. My brother pushed a cart.
b. My brother is pushing a cart.

(2) A. “现在， 我家里养了一只 鸟”。
Xianzai, wo jia li yang *le* yi zhi niao.
Now, I home at raise LE one CL bird.
Now, I am raising a bird.

a. I raised a bird.
b. I am raising a bird.

B. “去年，我家里养了一只鸟”。
Qunian, wo jia li yang *le* yi zhi niao.
Last year, I home at raise LE one CL bird.
Last year, I raised a bird.

a. I raised a bird.
b. I am raising a bird.

(3) A. “昨天，弟弟手里抱了五本书”。
Zuotian, didi shouli bao *le* wu ben shu.
Yesterday, brother hand carry LE five CL book.
Yesterday, my brother was carrying five books.

a. My brother carried five books.
b. My brother is carrying five books.

B. “现在，弟弟手里抱了五本书”。
Xianzai, didi shouli bao *le* wu ben shu.
Now, brother hand hold LE five CL book.
Now, my brother is holding five books.

a. My brother carried five books.
b. My brother is carrying five books.

(4) A. “昨天，我穿了一件 jacket”。
Zuotian, wo chuan *le* yi jian jiake.
Yesterday, I wear LE one CL jacket.
Yesterday, I wore a jacket.

a. I wore a jacket. (Preferred by native speakers)
b. I am wearing a jacket.

B. “现在，我穿了一件 jacket”。
Xianzai, wo chuan *le* yi jian jacket.
Now, I wear LE one CL jacket.
Now, I am wearing a jacket.

a. I wore a jacket.
b. I am wearing a jacket.

Stative:

(1) A. “昨天，我家院子里坐了三个老人”。
Zuotian, wo jia yuanzi li zuo *le* san ge lao ren.
Yesterday, my house yard in sit LE three CL old man.
There were three old men sitting in the yard yesterday.

a. There were three old people sitting in the classroom.
b. There are three old people sitting in the classroom.

B. “现在，我家院子里坐了三个老人”。
Xianzai, wo jia yuanzi li zuo *le* san ge lao ren.
Now, I house yard in sit LE three CL old man.
There are three old people sitting in the yard now.

a. There were three old people sitting in the classroom.
b. There are three old people sitting in the classroom.

(2). A. “现在，我的桌子上放了两本书”。
Xianzai, Wo de zuozi shang fang *le* liang ben shu.
Now, I DE table on put LE two Cl book.
There are two books on the table now.
a. There were two books on the table.
b. There are two books on the table.

B. “昨天，我的桌子上放了两本书”。
Zuotian, wo de zuozi shang fang *le* liang ben shu.
Yesterday, I DE table on put LE two Cl book.
There were two books on the table yesterday.

a. There were two books on the table.
b. There are two books on the table.

(3) A. “昨天，我家墙上挂了很多 jackets”.
Zuotian, wo jia qiang shang gua *le* henduo jacket.
Yesterday, I house wall on hang LE many jacket.
There were many jackets on the wall yesterday.

a. There were many jackets on the wall.
b. There are many jackets on the wall.

B. “现在，我家墙上挂了很多 jackets”.
Xianzai, wo jia qiang shang gua *le* henduo jacket.
Now, I house wall on hang LE many jacket.
There are many jackets on the wall now.

a. There were many jackets on the wall.
b. There are many jackets on the wall.

(4) A. “现在, 我家门外站了三个人”。
Xianzai, wo jia men wai zhan *le* san ge ren.
Now, I house door outside stand LE three CL person.
There are three people standing outside the door now.

a. There were three people outside the door.
b. There are three people outside the door.

B. “昨天，我家门外站了三个人”。
Zuotian, wo jia men wai zhan *le* san ge ren.
Yesterday, I house door outside stand LE three CL person.
There were three people standing outside the door yesterday.

a. There were three people outside the door.
b. There are three people outside the door.

Fillers:

(1) “我喜欢音乐”。
Wo xihuan yinyue.
I like music.
I like music.

(a). I like music.
(b). I like sports.

(2) “我吃 cheese”.
Wo chi cheese.
I eat cheese.
I eat cheese.

(a) I don’t eat cheese.
(b) I eat cheese.

(3) “我常常游泳”。
Wo changchang youyong.
I often swim
I often go swimming.

(a). I often go skiing.
(b) **I often go swimming.**

(4) “我姐姐是老师”。
Wo jiejie shi laoshi.
I sister is teacher
My sister is a teacher.

(a) **My sister is a teacher.**
(b) My sister is a student.

(5) “我花了 10 元钱”。
Wo hua le shi yuan qian.
I spend LE ten CL money.
I spent ten Yuan.

a. I spent 20 yuans.
b. I spent 10 yuans.

(6) “我和同学打篮球了”。

Wo he tongxue da lanqiu le.
I and classmate play basketball LE.
I and my classmates played basketball.

a. I played basketball.
b. I played volleyball.

(7) “我很高兴”。

Wo hen gaoxing.
I very happy.
I am very happy.

a. I am not happy.
b. **I am very happy.**

(8) “我的衣服是黄色”。

Wo de yifu shi huangse.
I DE cothes be yellow.
My clothes are yellow.

a My clothes are yellow.
b My clothes are blue.

(9) “我洗了一件衣服”。

Wo xi *le* yi jian yifu.
I wash LE one CL clothes.
I washed clothes.

a. I washed the dishes.
b. **I washed the clothes.**

(10) “妈妈做了一个蛋糕”。

Mama zuo *le* yi ge dangao.
Mom make LE one CL cake.
Mom made a cake.

a. Mom made a cake.
b. Mom made a pie.

(11) “昨天，我去了 Wal-mart”.
Zuotian, wo qu *le* Wal-mart.
Yesterday, I go LE Wal-mart.
Yesterday, I went to Wal-mart.

a. I went to Wal-mart.
b. I went to Target.

(12) “我买了两本书”。
Wo mai le liang ben shu.
I buy LE two CL book
I bought two books.

a.I bought 3 books.
b.I bought 2 books.

(13) “我要去卫生间”。
Wo yao qu weishengjian.
I will go bathroom.
I will go to bathroom.

a. I will go to the bathroom.
b. I am in the bathroom.

(14) “爸爸在听音乐”
Baba zai ting yinyue.
Dad ZAI listen music.
Dad is listening to the music.

a. My dad listened to music.
b. My dad is listening to music.

(15) “弟弟在吃着饭看书”
Didi ZAI chi che fan kan shu.
Brother ZAI eat Dur meal read book.
Brother is reading the book when he is eating.

a. My brother is eating.
b. My brother ate a meal.

(16)“我买过很多旧书”。

Wo mai guo henduo jiu shu.
I buy GUO many second-hand book
I bought a lot of second-hand books.

a. I will buy second-hand books.
b. I bought second-hand books.

(17) “我在写信”

Wo zai xie xin.
I ZAI write letter.
I am writing letter.

a. I will write a letter.
b. I am writing a letter.

(18)“姐姐在图书馆学习”。

Jiejie zai tushuguan xuexi.
Sister ZAI library study.
Sister is studying at library.

a. My sister is studying at the library.
b. My sister studied at the library.

(19) “孩子们在公园里唱歌”

Haizi-men zai gongyuan li changge.
Child-pl. ZAI park in sing
Children are singing in the park.

a. The children are singing in the park.
b. The children will sing in the park.

(20) “我看过很多美国电影”

Wo kan guo henduo meiguo dianying.
I watch GUO many America movie
I watched a lot of American movies.

a. I will watch a lot of American movies.
b. **I watched a lot of American movies.**

(21) “我的很多同学看过这本书”。

Wo de henduo tongxue kan *guo* zhe ben shu.
I DE many classmates read GUO this CL book.
Many classmates of mine read this book before.

a. My classmates read this book.
b. My classmates will read this book.

(22) “我要去邮局买邮票”。

Wo yao qu youju mai youpiao.
I want go post office buy stamp
I want to go to the post office to buy stamps.

a. I went to the post office.
b. **I will go to the post office.**

(23) “弟弟在院子里站着”。

Didi *zai* yuanzi li zhan *zhe*.
Brother ZAI yard in stand ZHE.
His brother is standing in the yard.

a. My brother stood in the yard.
b. My brother is standing in the yard.

(24) “我去过 Canada”.

Wo qu guo Canada.
I go GUO Canada.
I have been to Canada.

a. I will go to Canada.
b. I have been to Canada.

Appendix II: result tables

Table for figure 1: Correct rate for experiment 1:

	ACCOMP-LISHMENT		ACHIEVE-MENT		ACTIVITY		STATIVE	
	Correct rate	Std. error	Correct rate	Std. error	Correct rate	Std. error	Correct rate	Std. error
Learner	100%	0	97.22%	2.78	13.89%	11.1	41.67%	13.17
NS	100%	0	100%	0	80.56%	8.10	88.89%	8.45

Table for figure 2: the correct rate of native speakers and learners in experiment 2

	Native Chinese		L2 Chinese	
	Correct rate (%)	Std. error	Correct rate (%)	Std. error
future	91.67	5.51	54.17	11.22
past	86.11	6.05	51.39	14.73

Table for figure 3: The mean and std. error of reaction time for native speakers in experiment 2

	Mean (ms)	Std. error(ms)
Future	5622.78	538.96
Past	4422.66	621.46

Table for figure 4: the interpretation of the verbal le combining with 4 verb types with the temporal words

	ACCOMP-LISHMENT		ACHIEVE-MENT		ACTIVITY		STATIVE	
	Correct rate	Std. error	Correct rate	Std. error	Correct rate	Std. error	Correct rate	Std. error
Learner	91.67%	2.95	90.28%	3.47	97.22%	1.84	97.22%	1.84
NS	87.5%	3.61	91.67%	2.95	98.61%	1.39	97.22%	1.84