The Influence of the Finite and Non-finite Distinction in the L1 on the Acquisition and Processing of Multi-Verb Constructions in the L2

---A Bidirectional Study of Chinese Learners of English and English Learners of Chinese

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Abstract

English and Chinese are typologically different in the composition of Multi-Verb Constructions (MVCs), which refer to a series of verbs appearing in a mono-clause, without pauses or conjunctions. English MVCs contain a finite verb which inflects with tense, combined with non-finite forms (e.g., *The boss encouraged Jerry to attend the meeting*). Chinese MVCs are in the form of bare verbs or verbs with aspectual morphemes (e.g., *lǎobǎn gǔlì jié lǐ cānjiā huìyì*, "boss encourage Jerry attend meeting"). This dissertation aims to explore whether and how these cross-linguistic differences influence L2 acquisition and processing.

The results of the present research showed evidence of both morphological transfer of using bare verbs, and syntactic transfer of over-inflecting non-finite verbs in Chinese ESL (English as Second Language) learners' written production. Further cross-linguistic evidence was found in their online lack of sensitivity to over-inflected non-finite verbs in self-paced-reading tasks, which was more prominent in learners of lower L2 proficiency. In contrast, no L1 influence was found in their explicit knowledge of finite and non-finite distinctions as tested via grammaticality judgment tasks. In the bidirectional study using the same research methods, the syntactic transfer occurred in the form of mis-positioned aspectual markers. It appears that English CSL (Chinese as Second Language) learners tended to equate the aspectual marker to the tense marker and to, therefore, comprehend the multiple verbs in Chinese MVCs in accordance with the cue of finite and non-finite distinctions as they would in their L1, English. They were also less sensitive to various salient lexical cues in interpreting the interrelations of the multiple verbs.

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Author's Declaration

I hereby declare that the work presented in the thesis is my own, and have been generated as the result of my own original research since the official commencement of this degree program. I confirm that where I have consulted the published work of others, it is always clearly attributed. This work has not, in whole or in part, previously been published and has never been submitted for award at this, or any other university.

1. Chapter One Introduction

A multi-verb construction (MVC) involves a series of verbs appearing in a sentence, without pauses or conjunctions: the construction is a prosodically-independent unit, with each verb representing an action, an event phase or a state (e.g., *the boss encourages Jerry to attend the meeting*). English multi-verb constructions contain a finite verb which inflects with tense, combined with non-finite forms, which are either *to*-infinitives (*to attend*), gerunds (verb root plus *-ing*) or participles (verb root plus *-ed*). As non-finite verbs, they are neither inflected for grammatical tense nor undergo subject-verb agreement. Since Chinese has neither grammatical tense nor inflection, multiple verbs in comparable constructions take the form of bare verbs. In certain types of Chinese MVCs, such as verbs as subject or object (e.g., *chōuyān wéihài shēntǐ jiànkāng*, "smoke harm body health", smoking harms people's health), the series of bare verbs can be differentiated by a lexical cue. Specifically, matrix verbs can be identified because only they allow certain aspectual markers (e.g., adverb: *yǐ-jīng*, "already"; morpheme: *le*, the perfective marker). In certain types of Chinese MVCs (e.g., *wǒ huí jiā chīfàn,* "*I go home have dinner*", I go home to/ and have dinner), the two verbs are regarded as a compound predicate which refers to two verbs in one temporal category, with fixed order and no conjunctions (Tao, 2009), a language phenomenon without a counterpart in English.

There has been a long-running discussion on the typological differences in MVCs about Chinese finite and non-finite verb distinctions. Many researchers have noted the importance of covert temporal information and specific syntactic structures in determining the finite verb in a tenseless language, and so proposed a finiteness category in Chinese (H. Fang & Zhao, 2008; Gu, 2007; Guo, 2012; Her, 2008; Hu,

1997; C. Huang, 1982, 1989; J. Li, 1924; J. Li & Liu, 2005; Y. Li, 1985, 1990; Ma, 1898; Y. Shi, 2001; Song, 2000; Tan, 1995; S. Tang & Lee, 2000; T. Tang, 2000; Tsai, 2006; Wang, 2010; Xing, 2004; B. Yang, 2015; Y. Yang & Tsai, 2011). However, a number of researchers denied the existence of finite and non-finite distinctions in Chinese (Hu, Pan, & Xu, 2001; Y. Huang, 1992, 1994, 2000; T. Li, 1999; Lin, 2006; D. Liu, 2010; Lv, 1947; L. Wang, 1954; L. Xu, 1986, 1995, 1999; J. Xu, 2006; Zhu, 1985). Although there has been a considerable theoretical discussion of Chinese finiteness, no research has been undertaken to date on the influence of typologically different finiteness in the L1 on the acquisition of MVCs in the L2. Given the cross-linguistic differences between MVCs in English and Chinese, it is likely that learnability problems will arise and that cross-linguistic transfer might be predicted.

If there is a finite and non-finite distinction in certain types of Chinese MVCs, the distinction may be based on semantics and is "covert" because of the lack of inflection and tense (e.g., Whorf, 1945). The "overt" morphological finite and non-finite distinction in English may lead to Chinese ESL learners' difficulty of mapping the meaning of finiteness/ non-finiteness with the correct forms in the acquisition and processing of English MVCs. Meanwhile, some Chinese MVCs with compound predicates are likely to be transferred to English and result in the lack of a finite and non-finite distinction. In the opposite direction, when learners learn an L2 with no morphological finiteness (Chinese) from a language background with overt finite and non-finite distinctions (English), the question is how they comprehend sentences with multiple verbs without the aid of morphology and how this may impact on the way in which they compose sentences in the target language.

Although there has been some research on the acquisition of MVCs in the L2, a

number of questions remain. For instance, studies on the acquisition of English MVCs by Chinese learners have been limited to error analyses and comparisons of the frequency of learners' production of the construction; studies on the acquisition of Chinese MVCs by English learners found that pivotal sentences and serial-event sentences are difficult for learners, but the research focused only on error types, e.g., redundant or missing words, with little exploration of the reasons of these errors. Furthermore, there has been no investigation into whether or not the L1 plays a role in the comprehension of such constructions. In addition to being limited as to the type of phenomena being studied, no work to date has investigated learners' (or native speakers') real-time processing of MVCs. As Mai (2015) commented, "research using time-course sensitive online measures such as eye-tracking and self-paced reading is still rare." (p. 15).

The current research aims to fill these gaps and to explore if and how the differences in finite and non-finite distinctions between the L1 and L2 influence L2 acquisition and the processing of MVCs. This thesis will introduce Chinese and English MVCs and provide a detailed comparison of finiteness in Chinese and English MVCs based on Klein's theory on semantic finiteness (Klein, 1998, 2006, 2009) in Chapter Two. Chapter Three examines the learnability problems facing these two groups of L2 learners, reviews the theories on cross-linguistic influences and introduces different types of knowledge in the L2. Chapter Four presents the research questions and focuses on the research significance of the study and its methodology. In Chapter Five, the interlanguage of L2 learners of Chinese will be examined via the Chinese Learners' English Corpus (Gui & Yang, 2003), and the online and offline experiments that were undertaken in the study will also be described. In Chapter Six, the interlanguage in the HSK Dynamic Composition Corpus (X. Cui, 2006) of English

L2 learners of Chinese will be examined and the online and offline experiments undertaken with the English learners will be described. A general discussion of the findings of the experiments and theoretical implications for second language acquisition is provided in Chapter Seven while Chapter Eight concludes the thesis.

2. Chapter Two Multi-Verb Constructions and Finiteness

Verbs are the core of a sentence. Descriptive linguists and comparative syntacticians have examined the typological differences in Multi-Verb Constructions (MVCs) which comprise several verbs as a reflection of related events. This chapter will present the definition of MVCs, typological differences between Chinese and English MVCs, and the grammatical property "finiteness" in MVCs.

2.1 Multi-Verb Constructions

2.1.1 Definition

A multi-verb construction (MVC) is defined as the juxtaposition of two or more verbs in a monoclausal construction without pauses or conjunctions (Aikhenvald & Muysken, 2011). The construction is a prosodically-independent unit, with each verb representing an action, an event phase or a state (e.g., the boss encourages Jerry to attend the meeting).

MVCs have a broader range than serial-verb constructions according to the definitions of the former (Aikhenvald & Muysken, 2011) and latter (Aikhenvald, 2006; Tao, 2009), although these two terms are employed interchangeably by certain researchers. A Serial-Verb Construction (SVC) is a string of verbs or verb phrases within a single clause that express simultaneous or immediately consecutive actions (e.g., *Nǐ qù chīfàn*, "you go have dinner"). They are often described as coding a single event (A. Aikhenvald, 2006), having a single grammatical subject, and having no connective markings, and are marked or understood as having the same grammatical categories, such as aspect, modality, negativity or positivity, and tense (e.g., *you come see me anytime*) (Tao, 2009).

There are typological differences in the form of MVCs, but they reflect a multidimensional continuum in all languages. Aikhenvald and Muysken (2011) noted that:

> [a]n MVC includes serial verbs in their varied guises, predicates with an auxiliary verb or a coverb, and many more kinds. Each of these describes what can be conceptualized as one event. One kind can develop out of another, and each represents a specific way of cognitive packaging of information. The multiplicity of constructions including more than one verb can be presented as a multidimensional continuum, reflecting a minute classification of event types. (p. vii).

For example, in typologically-distant languages, like English and Chinese, MVCs comprise different forms and features. In English, multiple verbs appear in the form of finite and non-finite verbs, with a clear morphological distinction between the two. Non-finite verbs are dependent on finite verbs, and each clause should contain only one finite verb in a clause. In contrast, as a language which lacks inflection and grammaticalized tense, Chinese multiple verbs either take the form of bare verbs, or have verbs with aspectual adverbs or morphemes indicating their aspectual information. Time characteristics and internal relations are not realized morphologically. In the following section, details about English and Chinese MVCs will be provided.

2.1.2 MVCs in English

"Multi-verb constructions often consist of a main, inflected verb, and another verb marked as dependent on it. The form may vary (and so does terminology: in some traditions, the dependent form is called 'infinitive', in others 'participle' and in others

'gerund', or 'coverb'" (Aikhenvald & Muysken, 2011, p. 12). In English, non-finite verbs ([-F] verbs) are neither inflected by grammatical tense nor undergo subject-verb agreement. Finite verbs ([+F] verbs) are in the position of predicates as matrix verbs, with non-finite verbs occupying other positions in the sentence, such as subject, object, object complement and adverbial. Examples are provided in Table 1.

Table 1 *Syntactic Positions of Non-finite Verbs and Examples in English MVCs*[1]

Syntactic positions	Examples
[-F] as subject	Seeing is one thing; doing is another.
[-F] as object	I expected to enter graduate school in the fall.
[-F] as object complement	Please allow me to introduce Mr. Smith to you.
[-F] as adverbial	I must leave now to get there on time.

In general, finite verbs have a compulsory tense and aspect, and non-finite verbs are not restricted by the number and person of the subject, are not used to express an event time independently, and are applicable in any position within a sentence, except for the predicate.

2.1.3 MVCs in Chinese

Li and Thompson (1981) defined MVCs in Chinese as "a sentence that contains two or more verb phrases or clauses juxtaposed without any marker indicating what the relationship is between them" (p. 594). Chinese verbs do not have morphological inflections related to the person, gender, number, time, and can function as the subject,

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[1] Non-finite verbs in English can occupy other syntactic positions, but do not form part of a cross-linguistic comparison and are unrelated to the current research purposes. Thus, [-F] in other syntactic positions are not included in Table 1.

object, and complement in a sentence. Due to the lack of morphological distinctions among the juxtaposed verbs, the way in which the relations among the verbs are interpreted depends on the semantics of the verbs. Li and Thompson (1981) ranked all Chinese sentence patterns in (NP) V (NP) (NP) V (NP)[2] as MVCs. Four types of MVCs are introduced in Table 2.

Table 2 *Four Types of Chinese MVCs with Examples*

Types of Chinese MVCs	Examples
One verb or clause serving as the subject	dú shū shì hǎo xí-guàn read book be good habit Reading books is a good habit. (D. Li & Cheng, 2008, p. 37)
One verb or clause serving as direct object of another verb	tā-men xiǎng huí jiā they want go home They want to go home. (D. Li & Cheng, 2008, p. 249)
Pivotal constructions	wǒ-men qǐng nǐ chàng yī-zhī gē we invite you sing a song We invite you to sing a song. (D. Li & Cheng, 2008, p. 485)
Two or more separate events	wǒ mǎi piào jìn qù I buy ticket enter go I bought a ticket and went in. (a) I bought a ticket to go in. (b) (Li & Thompson, 1981, p. 595)

A pivotal sentence can be defined as follows: "of the two predicates in a sentence, the object of the first predicate (verb) is at the same time the subject of the second one" (D. Li & Cheng, 2008, p.485). Two pieces of information arise from this definition: the two verbs are all regarded as predicates, and the frame of the structure is that a noun "pivot" connects V_1 (verb one) and V_2 (verb two), functioning both as the object of V_1 and as the subject of V_2. An example of a pivotal sentence is provided in Table 2. There are several sub-types of pivotal sentences from the semantic perspective, such

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[2] NP=noun phrase, V=verb, and the NPs in parentheses are all optional.

as the pivotal predicate referring the "purpose and result of the action indicated by the first verb in the sentence" and the first verb "indicating the request, commend and cause" (D. Li & Cheng, 2008, p. 487). Other pivotal sentence types include those with the first verb "*yǒu*" (have) and the pivotal predicate clarifying the state or the action of the pivot, or those with the first verb "*shì*" (be) and the pivotal predicate explaining the first verb (D. Li & Cheng, 2008). Even though the specific classification of pivotal sentences according to the semantics of the V_1 and V_2 varies (e.g., An & Liu, 2004; Xing, 2004), it is widely accepted that the pivotal predicate indicating the purpose or result of the action expressed by the first verb is the prototypical pivotal sentence. The present study will only involve prototypical pivotal sentences.

As mentioned by Li and Thompson (1981), the case where two or more separate events in certain relations are juxtaposed together as a continuum is the typical and most common multi-verb construction. The two events appear to be separate but indeed are understood as being related to each other either as one consecutive event, the purpose, the alternation or the circumstance of another event (Li &Thompson, 1981). Tao (2009) calls these two events a compound predicate with a single grammatical subject, having no connective markings, and are marked or understood as sharing the same grammatical features, such as aspect, modality, negativity or positivity, and tense. Since no obligatory syntactic features indicate the specific relations between the two, many of the sentences within this group can be understood in more than one way. For convenience, later in this thesis, sentences with two or more separate events will be labeled "serial-event" sentences. The example of serial-event sentences in Table 2 shows that "*go in*" can be understood as both the purpose and the consecutive event of "*buy a ticket*". Thus, one Chinese serial-event sentence can be ambiguous, conveying the meanings expressed by two different English sentences.

In sum, Chinese MVCs possess the following features:

a. Verbs are not morphologically marked for person, gender, number or time.

b. Verbs can function as subject, object, or compose compound predicates without morphological changes.

c. Sentences with MVCs include those with verbs as subject, direct object, pivotal sentences, and serial-event sentences.

2.1.4 A Typological Comparison

Li and Thompson (1981) state that:

[t]he fascinating thing about these constructions is that although all of them have the same form, namely, represented in (NP) V (NP) (NP) V (NP), with no markers of any kind to signal how the two verb phrases are to be related to each other, speakers interpret them in different ways according to the meanings of their verbs. (p. 620)

In contrast to the apparent morphological difference between finite and non-finite verbs in English MVCs, indicating the non-finite verbs' dependency as well as the finite verbs' temporal information, multiple verbs in Chinese do not undergo any morphological changes. Given the differences existing at the morphological level between English and Chinese MVCs, a more abstract category of finite and non-finite distinction arises. Two questions follow the typological comparison:

a. Is the contrast between English and Chinese MVCs merely a reflection of the morphological differences, with similar concepts of finiteness?

b. Is the concept of finiteness absent from Chinese?

If the former, the cross-linguistic differences will lie in the surface form-meaning mapping, and the difficulties that learners encounter will be related to how to map the meaning onto the correct forms. However, if Chinese lacks finiteness as a concept, L2 learners will be compelled to construct a concept that does not exist in their L1. To explore whether or not there is the finite and non-finite distinction in Chinese, the definition of finiteness, theories on finite and non-finite distinctions will be introduced in Section 2.2.

2.2 The Distinction between Finite and Non-finite Verbs

2.2.1 Definition of Finiteness and its Development

According to the online British dictionary, finiteness denotes "any form or occurrence of a verb inflected for grammatical features such as the person, number and tense" (Finiteness, n.d.-a). The free dictionary defines finiteness as "of or relating to any of the forms of a verb that can occur on their own in the main clause and that can formally express distinctions in person, number, tense, mood, and voice, often by means of conjugation, as the verb *sees* in *She sees the sign*" (Finiteness, n.d.-b). Moreover, Curme (1931) described it as "to the finite forms of the verb, i.e., those limited by person, number and mood, are the infinite forms, i.e., those not thus limited, verbal forms without person, number, and mood." (p. 8448)

The research on finiteness can be traced back to the Latin term "finites", meaning "definite or determined in the sense referring to a particular person" (Sauter, Bailey, Wyllie, & Glare, 1968, p. 705). The development of the understanding of the concept of finiteness is reflected by these changing definitions. The Oxford Dictionary of English Grammar (Chalker & Weiner, 1994) states that "in some recent work in

linguistics the idea that verb forms are finite or non-finite has been abandoned. Instead, finiteness is regarded as a property of higher-order units such as clauses." (p. 157). Nikolaeva (2007) proposes that "the development of syntactic theory starting from the 1960s led to an obvious departure from traditional assumptions. Finiteness was reanalyzed as something more abstract, essentially a clausal category that is only secondarily reflected in the form of the verb" (p. I).

The understanding of the division between finite and non-finite verbs has undergone a number of stages, which are respectively inflectional description (tensed forms vs. non-tensed forms), distributional description (predicate verbs vs. non-predicate verbs), parameters to determine the weakness of finiteness (being predicate, with tense, in agreement with the person and number of subject, being notional verbs or functional verbs, having mood markers), and the relations among the clauses (finite clauses vs. non-finite clauses).

The definition of finiteness has been developing, but, the afore-mentioned criteria apply mainly to inflectional languages, such as English. The question of how to view finiteness in a non-tensed language is important but complex, and a vast body of research on Chinese finiteness has contributed to this field.

2.2.2 Previous studies on Chinese Finiteness

Previous research on Chinese multi-verb constructions mainly centered on whether finite verbs and non-finite verbs exist and, if so, how to distinguish between them. Finiteness in Chinese has been a controversial issue for over 100 years. B. Yang (2015) notes that the disputes in this regard share three characteristics: a long history, different theoretical bases, and scholars' changeable positions.

2.2.2.1 Proponents of the Finite vs. Non-finite Distinction in Chinese

A number of scholars have proposed a method for categorizing finiteness in Chinese (H. Fang & Zhao, 2008; Gu, 2007; Guo, 2012; Her, 2008; Hu, 1997; C. Huang, 1982, 1989; J. Li, 1924; J. Li & Liu, 2005; Y. Li, 1985, 1990; Ma, 1898; Y. Shi, 2001; Song, 2000; Tan, 1995; S. Tang & Lee, 2000; T. Tang, 2000; Tsai, 2006;Wang, 2010; Xing, 2004; B. Yang, 2015; Y. Yang & Tsai, 2011). Within this group, there exist diverse perspectives, including research on: the criteria for distinguishing finite verbs from non-finite ones (C. Huang, 1982, 1989; J. Li & Liu, 2005; Y. Li, 1985, 1990; Lin, 2011; Y. Shi, 2001; Tan, 1995; C. Tang, 1990; Xing, 2004); sentence types which have a finiteness distinction (H. Fang & Zhao, 2008; J. Li & Liu, 2005; Y. Shi, 2001; Tan, 1995; B. Yang, 2015); and the plausibility of finiteness distinction in Chinese (B. Yang, 2015; Y. Yang & Tsai, 2011).

Many researchers have noted the importance of covert temporal information in determining finite verbs in a non-tensed language. C. Huang (1982) believes that the modal marker "*huì*" (will/ would/ can) can only be used in finite clauses. For instance, in the sentence "*wǒ zhǔn bèi míng tiān lái*" (I prepare tomorrow come), "tomorrow come" is a non-finite clause, because it is ungrammatical to have "*huì*" before "come" to make a sentence "**wǒ zhǔn bèi PRO[3] míng tiān huì lái*" (I prepare tomorrow will come) (Huang, 1998, p.248). Y. Li (1990) argues that in addition to "*huì*", the modal marker "*yào*" (will/ would/ want) can be a criterion for [+-F] (e.g. "**wǒ zhǔn bèi PRO míng tiān yào lái*" (I prepare tomorrow will come)). She also proposed that the time adverb "*cóng-qián*" (before) and aspectual marker "*guò*" (experiential aspectual

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[3] PRO is the empty subject.

particle (ASP)) co-occur to modify the finite verb. For example, in the sentence "*wǒ cóng qián gào sù guò tā [nǐ lái zhè ér]*" (I before tell ASP he you come here), "*gào sù*" (tell) is the finite verb because the time adverb and aspectual particle can modify it. In contrast, "*lái*" (come) is nonfinite because the sentence "**wǒ cóng qián gào sù tā [nǐ lái guò zhè ér.]*" (I before tell he you come ASP here.) is unacceptable (Y. Li, 1990: 18-19).

C. Tang (1990), Tan (1995) and other researchers have attempted to deduce rules from certain syntactic structures. For example, the V-not-V question can occur in the finite clause (e.g., "*Nǐ juédé [tā huì bù huì qù]?*" (You think he will not will go?)), whereas V-not-V is not allowed to occur in the nonfinite clause (e.g., "*Nǐ shèfǎ [e qù bù qù]?*" (You try e go not go?)) (C.-C. Tang 1990, p. 331).).

From a cognitive perspective, Y. Shi (2001) argued that, in describing multiple verbs which occur simultaneously, only one verb indicates temporal information. He proposed that finite verbs in Chinese have grammatical markers to indicate time information, such as aspect particles "*le*" (completion aspectual marker), "*guò*" (experiential aspectual marker) and reduplication. These grammatical markers can only co-occur with finite verbs, and not with non-finite ones. Based on this criterion, he noted that verbs as subject or direct object, and verbs following the prepositions in a sentence tend to be non-finite, adding that the flexible syntax of Chinese makes several interpretations possible, so aspectual markers may appear after V_1 or V_2 to indicate different meanings, but the aspectual marker can only appear once.

From a functional-typological perspective, B. Yang (2015) argued that morphological inflection is a basic property of ancient Chinese, ancient Tibetan, Tibetan, the Tibetan dialects, Jingpo, Zhuang, Hmong, Yao, and so is constantly

developing and changing, and cannot be regarded as a criterion for determining finiteness. He believed that certain grammatical categories are marked "not by morphemic tags but by types of patterning, by lexical selection, or by word-order" (Whorf, 1945, p. 2). Based on whether a subject is present, whether the verb is the predicate, and whether the verb changes with number and person, B. Yang lists the different types of finite and non-finite clauses. Among these, verb or verb phrases as the subject are non-finite clauses, pivotal sentences, and serial-event sentences are pseudo non-finite clauses.

In sum, these researchers proposed certain criteria for drawing a [+-F] distinction in Chinese, based on various theoretical perspectives. Other studies have focused on assessing the plausibility of Chinese finiteness based on empirical evidence.

Y. Yang and Tsai (2011) provided experimental evidence from ERP and fMRI[4] to demonstrate that syntactical features play an important role when classifying nouns and verbs in Chinese. In their fMRI experiment, nouns, verbs, and adjectives were respectively placed in sentences as the modifier of the same nouns (e.g., *zhíyè lǜshī,* "profession lawyer"; *biànhù lǜshī,* "defend lawyer"; *zhùmíng lǜshī,* "famous lawyer") and the results showed significant differences in brain reaction related to three conditions. In cases where the verb acted as a modifier, the left middle frontal gyrus (where syntactical processing occurs) was activated (Luke, Liu, Wai, Wan, & Tan, 2002). This indicated that complex syntactical processing was occurring that entailed changing the property of finite verbs to other functions (e.g., non-finite functions),

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[4] An ERP (event-related-potential) is the brain's electrical response to a known stimulus. Functional magnetic resonance imaging or functional MRI (fMRI) is a functional neuroimaging procedure that use MRI technology to measure brain activity by detecting changes associated with blood flow. This technique relies on the connection between cerebral blood flow and neuronal activation.

even though the morphology remained unchanged.

In the same paper, Y. Yang and Tsai (2011) also illustrated the existence of finiteness in Chinese from the perspective of child L1 acquisition. Infinitive sentences (e.g., *they go there*) are often used by 2-3-year-old English children, which has been labeled the optional infinitive stage (OIS) by developmental linguistics. The researchers found that 2-3-year-old Chinese children also experienced OIS by using negative imperative sentences, such as *bàba bù lái*, "dad not come". In conclusion, Y. Yang and Tsai (2011) argued that "abstract finiteness exists intrinsically in Chinese verbs without phonological realization" (p.174).

2.2.2.2 Opponents of the Finite vs. Non-finite Distinction in Chinese

A number of researchers maintain that Chinese does not distinguish finiteness (Hu, Pan, & Xu, 2001; Y. Huang, 1992, 1994, 2000; T. Li, 1999; Lin, 2006; D. Liu, 2010; Lv, 1947; L. Wang, 1954; L. Xu, 1986, 1995, 1999; J. Xu, 2006; Zhu, 1985). These researches are based on the following three perspectives.

a. Chinese is not a tense language.

b. Adjectives can play the role of predicates in Chinese.

c. The criteria proposed by the proponents of Chinese finiteness fail to explain all types of sentences containing multiple verbs.

A selection of representative studies will now be briefly summarized.

L. Xu (1985, 1986, 1994) argued that the ungrammaticality of non-finite verbs with "*huì*" (will/would/can), proposed by C. Huang (1981), is due not to finiteness, but to the semantic incompatibility arising from the fact that "*huì*" in Chinese denotes not only futurity (will) but also possibility and uncertainty (possibly). Referring to the

aspectual marker "*guò*", L. Xu (1985, 1986, 1994) noted that "*guò*" (an experiential aspectual particle) can serve as both a perfective aspect marker and a verb indicating an experience, so different interpretations can be derived, all of which are acceptable when "*guò*" is situated after the predicates of different clauses (e.g., a. "*wǒ qǐng tā [chī guò fàn.]*" (I invite he have ASP supper.) b. "*wǒ qǐng guò tā [chī fàn.]*." (I invite ASP he have supper.). The criteria of C. Tang (1990) and Tan (1995) for defining finite clauses based on certain syntactic structures were disproved by Hu et al. (2000), by providing counter examples. For example, "V-not-V" can also be used in the so-called "non-finite" clauses (e.g., "*Nǐmen dǎsuàn jīn wǎn hái shuì bù shuìjiào?*" (you plan tonight e sleep-not-sleep sleep?)).

T. Li (1999) disagrees with Y. Shi (2001), noting that simultaneous sub-events can both be finite; for example, in Chinese, "*yòu*" (and), and "*yī biān*" (meanwhile) can refer to events that are happening simultaneously. See Table 3 for a summarization of the examples of criteria in distinguishing Chinese [+-F] and disapproval opinions.

In sum, several of the representative ideas in the debate on how to distinguish between finite and non-finite verbs in Chinese have been outlined above. Chinese lacks inflectional morphology and tense and has a flexible word order, so it relies heavily on semantics, pragmatics, information structure, and discourse. Based on the conventional division between morphology and syntax, it is difficult to determine with clarity whether or not finiteness exists in Chinese, even though many researchers have addressed this question. The only way to view finiteness from a cross-linguistic perspective is to expose its function within the specific languages under investigation (here, Chinese and English) and to explore its nature from a semantic perspective.

Table 3 *Examples of the Criteria of Chinese [+-F]*

Authors	Criteria	Example	Counter arguments
1982 C. Huang	modals like "huì" (will)"	a. *wǒ zhǔn bèi [PRO míng tiān huì lái]. I prepare tomorrow will come. b. wǒ zhǔn bèi míng tiān lái. I prepare tomorrow come.	L. Xu (1985-1986, 1994): It is due, not to finiteness, but to semantic incompatibility, since "huì" in Chinese can also denote possibility and uncertainty.
1990 Y. Li	tense markers like "yao" and "huì"	a. * wǒ quàn tā [huì lái.] I persuade he will come. 'I tried to persuade him to come.' b. wǒ gào sù tā [huǒ chē huì kāi.] I tell him train will leave 'I told him that the train would leave.'	Hu et al. (2001), e.g.: wǒ quàn tā [yào lái.] I persuade he will come. I tried to persuade him to come.
	co-occurrence of certain time adverbials and aspectual markers	a. * wǒ cóng qián gào sù tā [nǐ lái guò zhè ér.] I before tell he you come ASP here b. wǒ cóng qián gào sù guò tā [nǐ lái zhè ér.] I before tell ASP he you come here	L. Xu (1985–1986, 1994), Y. Huang (1994) a. wǒ qǐng tā [chī guò fàn.] I invite he have ASP supper. b. wǒ qǐng guò tā [chī fàn.]. I invite ASP he have supper.
1990 C. Tang	V-not-V question	a. Nǐ juédé [tā huì bù huì qù]? You think he will not will go? b. * Nǐ shèfǎ [e qù bù qù]? You try e go not go?	Hu et. al (2001), e.g. Nǐmen dǎsuàn jīn wǎn hái shuì bù shuìjiào?" you plan tonight e sleep-not-sleep sleep?
2001 Y. Shi	grammatical markers indicating time information (aspect markers, reduplication)	kàn diàn shì hěn fèi yǎn jīng . Watch TV very harm eyes. * kàn le diàn shì hěn fèi yǎn jīng. Watch le (ASP) TV very harm eyes. * kàn kàn diàn shì hěn fèi yǎn jīng. Watch watch TV very harm eyes.	T. Li (1999), e.g. wǒ men yī biān chōu yān yī biān hē jiǔ. We smoke and meanwhile drink wine.

2.2.3 Theories on Semantic Finiteness

Klein (1998) states that "the distinction between finite and non-finite forms is not a mere surface phenomenon" (p. 1). He disagrees with the definition of finiteness based on tense, person, mood or other features for two reasons:

[f]irst, an inflectional category is not just a set of morphological changes; it is a cluster of formal and functional properties. Second, the finite/ non-finite distinction between verb forms is also made for many languages in which morphological marking is the exception rather than the rule … for example, some fully-fledged languages, such as Chinese, lack inflection and are usually assumed to lack finiteness, although the absence of inflection does not exclude the existence of other means to express the same function. (Klein, 2006, pp. 1-2)

According to Klein, finiteness should be regarded as a grammatical category. A theory of finiteness based on "assertion" has been proposed (Klein, 1998, 2006, 2009; Klein, Li, & Hendriks, 2000). This provides a theoretical basis for a comprehensive view of finiteness and has enhanced our understanding of its function.

It has been proposed that "on some abstract level of representation, there is a claim component, which is regarded as AST (assertion)" (Klein, 1998, p. 1), as in the sentence, "*Jack went to school*". There are two reasons why "*went*" is stressed here: to emphasize the time, as opposed to "*Jack goes to school*" and also to reinforce the claim, as opposed to "*Jack did not go to school*". The finiteness of the verb "*went*", therefore, comprises two elements: the relevant temporal interval (known as the "topic time" or TT) and the claim (known as the "assertion" or AST).

According to Klein (1998), the finite component FIN [AST, TT] differs from its lexical content, which can be viewed as the non-finite "INF" component. "INF

minimally consists of the verb and its arguments" (Becker, 2005, p. 268), so FIN operates on INF, as FIN [AST, TT] (INF); for example, *Jack went to school,* FIN [AST,TT](INF[GO(JACK, SCHOOL)]).

The finiteness also has semantic effects. For example,

(1)   a. John found a unicorn.

b. John sought a unicorn. (Klein, 2006, p. 12)

The meaning of these two results differs, which is generally believed to be due to the lexical differences between verbs but, if these sentences are changed to the following, their readings will be different:

(2)   a. Finding a unicorn— what a bizarre idea!

b. It is the dream of each hunter to find a unicorn.

c. In order to find a unicorn, the hunters first went to the forest of Broceliande. (Klein, 2006, p. 13)

When "*find*" is a finite verb, the sentence means that the unicorn was caught but, when a non-finite one, the sentence implies the unicorn was not caught. "Indefinite noun phrases have a specific reading only if they are (directly or indirectly) in the scope of a finite verb" (Klein, 2006, p. 13).

To sum up, finiteness can be realized when the abstract operator FIN is functioning on lexical content INF, which constitutes semantic finiteness. This can (or, in some languages, must) be reflected in morphological finiteness as in English, or cannot be reflected on the morphological level, as in Chinese. It is important to draw a clear distinction between "morphological finiteness", "syntactic finiteness", and

"semantic finiteness" (Lasser, 1997), because "morphological finiteness is a property of verbs, whereas semantic finiteness is a property of utterances" (Becker, 2005, p. 267). Semantically speaking, TT constitutes the time of an assertion, i.e., the time for which a situation holds true, while AST is the descriptive content of the sentence.

In general, Klein's theory of finiteness adopts the perspective of semantics, in contrast to the traditional focus on the (surface) features of tense, person, number, and mood. This facilitates the cross-linguistic study of finiteness, given that many languages do not have an obligatory morphological marking of tense, person, and number. It can be summarized into three points:

a. The function of finiteness is to make an assertion (AST).

b. Finiteness is composed of assertion (AST) and topic time (TT); to express it in a formula, it is FIN (finiteness) [AST, TT] INF (infinite declaration).

c. Finiteness is a grammatical category which has effects on both syntax and semantics of utterances.

2.2.3.1 Finiteness in Chinese

According to Klein's theory of semantic finiteness, Becker (2005) states that:

[b]roadly speaking, an utterance is semantically finite when a state of affairs is stated to hold for some time interval (declarative force), or when it is questioned which of a set of a state of affairs holds for some time interval (interrogative force), or when it is required from the addressee to bring about a state of affairs at some time interval (imperative force) (p. 267).

Klein's theory on semantic finiteness seeks to answer the concerns of those who oppose the idea that Chinese utterances contain a finite element and question whether

finiteness is possible if there is no verb inflection or tense, and adjectives can be predicates. They also ask: if finiteness does exist, what is its marker? The answer is that Chinese has semantic finiteness, which is not reflected at the level of morphology, and if finiteness can be argued to be a grammatical category concerning information structure, comprising the time interval and assertion, as claimed by Klein (1998), then tense, mood, and morphology are insufficient criteria for determining finiteness. Tense, mood and morphology reflect finiteness in certain languages, like English. If one assumes that (semantic) finiteness exists in Chinese, the question is how this is marked in Chinese utterances. Klein et al. (2000) stated that:

> [t]he lexical content cannot specify when for which time, and how often such a situation obtains; it does not make a claim either, about whether such a situation obtains at all. To specify that the situation obtains, all Indo-European languages, for example, choose a particular variant of the finite verb to mark that a particular time span, the topic time (TT) (a) precedes, follows, or contains the time of utterance, and (b) precedes, follows, includes, or is included in the time of a situation with the properties indicated by the lexical content. In this view, the finite variant in (a) corresponds to the tense function, and that in (b) to the aspect function. Chinese does not have tense but the finiteness function can be expressed by optional particles; in the case of aspectual particles, they assert that TT precedes, follows, includes, or is included in the time of a situation described by the sentence. (p. 753)

Thus, the topic time of Chinese finiteness can be expressed by the aspectual particles, which are, respectively, "*-le, -guò, -zhe*". They follow the verb in a sentence and the particles express the perfective, progressive or experiential state of the verb:

Perfective (PFV): -le

Progressive/ durative (DUR): -zhe

Experiential (EXP): -guò

In Klein's theory, aspectual particles mark TT and, with AST, they compose a finite sentence. The following examples are provided for further illustration:

(3)   Jack   qù   le   xué xiào.

Jack   go   PFV   school.

Jack went to school.

In this sentence, there are temporal intervals and AST, functioning on INF [QU (JACK, XUEXIAO)]). The finiteness makes the sentence neither (4) a. nor b.

(4)   a. Jack   zhèng   qù   xué xiào.

Jack   DUR   go   school.

Jack is going to school.

b. Jack   méi   qù   xué xiào.

Jack   no   go   school.

Jack did not go to school.

Except for the aspectual particles, aspectual adverbs in Chinese also indicate the dynamic state of verbs. Particles and aspectual adverbs sometimes co-occur within a sentence, even though either may appear to indicate the aspectual meaning of the finite

verb; for example, in "*tā yǐ-jīng huí le jiā*", (he already go le home), "*yǐ-jīng*" (already) and "*le*" (perfective morpheme) co-occur. Lv (1942) stated that aspectual adverbs differ from other time adverbs (e.g., "*jīntiān*" (today)) in that, in expressing time, they rely on the verbs' dynamic status while the other adverbs have independent temporal meanings. Li and Thompson (1981) also noted that, usually, adverbs (e.g., "*jīntiān*" (today)) are movable, although some are unmovable (e.g., "*yǐjīng*" (already)), with an unmovable position in a sentence, that only govern the dynamic states of the verb, and indicate the aspect of the verb. Li and Thompson (1981) stated that:

> The functional characteristic of movable adverbs is that they are sentential adverbs, in the sense that they provide a semantic frame within which the event described by the sentence occurs. In this respect, they contrast with a semantically similar set of unmovable adverbs, such as yǐ-jīng (already), which is associated with the verb rather than the entire sentence. (pp. 320-321)

Xing (2004) points out that three adverbs "*yǐjīng*" (already), "*zhèngzài*" (in the process) and "*jiāngyào*" (will) are unmovable adverbs that express the dynamic states of the modified verb.

In sum, based on Klein's theory, it is concluded that semantic finiteness exists in Chinese, comprising TT (topic time) and AST (assertion), and that the relevant temporal interval is marked by aspect rather than tense.

2.2.3.3 Semantic Finiteness in Chinese MVCs

Based on the above analysis, Chinese semantic finiteness can be viewed as being marked by aspect, rather than tense, in which both particles and aspectual adverbs serve to mark the temporal information of the finite verb. In this section, aspectual particles and adverbs are used as a diagnostic method for distinguishing verbs in

MVCs. By checking whether aspectual particles or adverbs can be added to the bare verbs in MVCs, the function of the verb can be established; that is, any non-finite verb with aspectual information would be ungrammatical in a sentence.

In Chinese, the function of words can be expressed by their combinatory ability to compose phrases with other words. G. Fang (1939) proposes the term "broad morphology", which indicates that, even though there are no morphological inflections in Chinese, certain Chinese words can be combined with others while others cannot, which plays an important role in Chinese syntax. Wen and Hu (1954) divide words based on this combinatory ability; for example, "*hé*" (and) can be used between nouns but not verbs so, by checking whether "*hé*" can be used between two words, we can determine the syntactical property of a specific word. This shows that the limited ability to combine certain types of words can restrict the composition of sentences.

Given that there are several bare verbs, aspectual markers can only be combined with the finite verb on the basis of the [TT, AST] function.

Verbs as Subject or Direct Object

In sentences with verbs as subject, aspectual particles or adverbs can only be added to the predicate verb, so the latter is the matrix verb or, in other words, it is the dynamic word or finite verb, while the verb subject is the non-finite verb. Example (5) shows how to detect finiteness using the method of broad morphology.

(5)   <u>Chouyān</u>   <u>wēihài</u>   tā de   jiànkāng.

          V₁   V₂

      smoke   harm   his   health

    Smoking harms his health.

a. <u>Chouyān</u> **yǐjīng** <u>wēihài</u> **le** tā de jiànkāng.

smoke already harm PFV his health

Smoking has already harmed his health.

b. ***Yǐjīng** <u>chouyān</u> **le** <u>wēi-hài</u> tā de jiànkāng.

*already smoke PFV harm his health

Smoking has already harmed his health.

The non-finite verb is "*chouyān*" (smoke), while "*wēihài*" (harm) is the finite verb, since aspectual markers can only be combined with "*wēihài*" (harm), and not with "*chouyān*" (smoke). The finite verb marks the assertion and temporal information.

In sentences with verbs as object, similarly, aspectual markers can only be combined with predicate verbs, and the verb object is a non-finite verb. This is illustrated in example (6).

(6) Tāmen <u>tíngzhǐ</u> <u>gongzuò.</u>

         V1   V$_2$

they stop work

They stop working.

a. Tāmen **yǐjīng** <u>tíngzhǐ</u> **le** <u>gongzuò.</u>

they already stop PFV work

They have already stopped working.

b. *Tāmen <u>tíngzhǐ</u> **yǐjīng** <u>gongzuò</u> **le.**

*they   stop   already   work   PFV

    They have already stopped working.

So "*tíngzhǐ*" (stop) is the finite verb because it can be combined with aspectual markers, including adverbs in front of it and particles after it. In contrast, the verb-object "*gongzuò*" (work) is the non-finite verb, because no aspectual markers are allowed before or after it.

Pivotal Sentences

In pivotal sentences, V_1 is the predicate of the first subject and V_2 the predicate of the second subject; however, the subject of V_2 is also the object of V_1, so it is complex and difficult to distinguish finite from non-finite verbs, and this has been hotly debated among linguists. Using the diagnostic method of broad morphology, it emerges that the aspectual adverb "*yǐjīng*" (already) can only occur in front of V_1, while the aspectual particle "*le*" tends to follow V_2, as shown in the example (7).

(7) Tā   <u>jiào</u>   wǒ <u>cānjiā</u> huì yì.

      V_1 V_2

she   order   I   attend   meeting

She ordered me to attend the meeting.

  a. Tā **yǐjīng**   <u>jiào</u>   wǒ <u>cānjiā</u> **le**   huì yì.

    she already order I   attend PFV meeting

    She had already ordered me and I attended the meeting.

  b. *Tā **yǐjīng**   <u>jiào</u>   **le**   wǒ <u>cānjiā</u> huì yì.

* she   already   order PFV I   attend   meeting

She had already ordered me and I attended the meeting.

In this construction, the aspectual markers show inconsistency with regard to testing the finiteness of the two verbs: aspectual adverbs can be combined with V_1 but not V_2, which seems to indicate the finiteness of V_1; however, aspectual particles are usually combined with V_2, which gives V_2 temporal information that makes it possible to anchor the assertion to the reality.

Xing (2004) has examined pivotal constructions in the verb usage dictionary (Meng, Zheng, Meng, & Cai, 1999) and found that, of the 1,328 verbs contained therein 180 (13.55%) can be used as V_1 in pivotal constructions. In the pivotal sentences containing these 180 verbs, almost all the particles appear after V_2 rather than V_1. She thus argued that a pivotal sentence is a frame that should be regarded as a continuum. In the framework of the structure, V_1 marks the starting point for a series of events and, V_2 is the end point of that series of events, even though these two verbs do not share the same subject. As a continuum, aspectual adverbs should precede the starting point of V_1, and aspectual particles should occur after the end point of V_2. With the end point of events, there are two possibilities: one is that the end point is left open, and has not yet been realized. In this possibility, only V_1 is entitled to carry the aspectual information "*yǐjīng*" (already), and thus V_1 has both AST and TT. It is regarded as the finite verb. V_2 lacks TT and is regarded as the non-finite verb. This only happens when V_2 is a bare verb. Another possibility is that the end point is not left open but, instead, clearly marks the end of the whole continuum of the event, which occurs when V_2 is accompanied by particles indicating the specific temporal

information.

In pivotal sentences, there are two levels of understanding: when V_2 takes the form of a bare verb, the end point of the continuum is left open, and it is a non-finite verb but, when particles follow V_2, the end point of the continuum is clearly marked, and V_1 and V_2 are both finite.

Serial-event Sentences

In sentences with two serial events, Li and Thompson (1981) stated that the relation between the two verbs can be regarded as consecutive, purpose, circumstance, or descriptive in nature. No certain marks indicate the specific relationship between the two verbs, so many of the sentences within this group can be understood in more than one way. In the broad morphology test, both verb 1 and verb 2 are applicable, with aspectual adverbs and morphemes, as shown in example (8):

(8)   wǒ   <u>mǎi</u>   piào   <u>jìn qù.</u>

        <u>V_1</u>   <u>V_2</u>

I   buy   ticket   enter

I bought a ticket and went in. / I bought a ticket to go in.

a.   wǒ   **yǐjīng**   <u>mǎi</u>   **le**   piào   <u>jìn qù</u>

     I   already   buy   PFV   ticket   enter

     I already bought a ticket to go in.

b.   wǒ   **yǐjīng**   <u>mǎi</u>   piào   <u>jìn qù</u>   **le**

     I   already   buy   ticket   enter   go   PFV

     I bought a ticket and went in.

Serial-event sentences have two possible interpretations: when V_2 is the purpose of V_1, the temporal information is with V_1, and V_2 is non-finite. When V_1 and V_2 are understood to be in consecutive time order, they compose an event continuum, indicate the starting and end point of the event, and are both finite.

The finiteness in serial-event sentences shows that, without undergoing any morphological changes, V_2 can be interpreted as a non-finite verb with no aspectual information when it is understood as the purpose of V_1, or as a finite verb when it is understood as the consecutive of V_2.

To sum up, the different types of MVCs in Chinese display different aspects of semantic finiteness:

a. Aspectual adverbs and particles can only be added to finite verbs to mark the finiteness.

b. Verbs as subject or direct object are non-finite verbs.

c. V_1 and V_2 in pivotal sentences have two interpretations: without aspectual morphemes after V_2, V_2 has no TT features, and thus is regarded as non-finite; with perfective morpheme "*le*" after V_2, it marks the complement of the event continuum, and therefore V_2 has the features of both TT and AST as other finite verbs.

d. V_1 and V_2 in serial-event sentences also compose compound predicates and finiteness in serial-event sentences usually depends on the interpretation: with both verbs in the bare forms, V_2 can suggest the purpose of V_1 and be interpreted as the non-finite verb as adverbial or, the consecutive sub-event sharing the same temporal information and be interpreted as the finite verb.

The finiteness in different types of MVCs displays different characteristics, and it is difficult to draw a uniform distinction between finite and non-finite verbs in Chinese. The semantic finite and non-finite divisions in different types of MVCs are consistent with B. Yang (2015)'s argument, from the functional-typological perspective, that verb‑subject and verb-object are non-finite while pivotal and serial-event sentences are pseudo-non-finite clauses.

The property of finiteness in Chinese, as revealed by the diagnostic test based on semantic finiteness theory, differs from morphological finiteness. It is implicit, and can only be detected by the combinatory capability with aspectual adverbs or particles. In comparison, English has a direct, clear, uniform morphological difference between finite and non-finite verbs. A detailed comparison of MVCs, including the finite and non-finite distinction, will be presented in the next section.

In general, our understanding of the finite and non-finite distinction has developed from (surface) tense, person, number marking to syntactic positions, and subordinate clauses. Based on these criteria, many have endeavored to explain how Chinese, as a language without inflections or morphological changes, can distinguish finiteness or even if finiteness exists in Chinese. Some researchers have suggested that temporal information and syntactic structure play an important role in finiteness, but those who argue against the existence of Chinese finiteness have produced examples to disprove these criteria. Even though several researchers have provided evidence for the plausibility of Chinese finiteness, using ERP, the fMRI methodology and studies of children's L1 acquisition, without the support of a grounded theory on finiteness, this evidence appears fragmentary. Against this background, the concept of semantic finiteness was introduced by Klein (1998, 2006, 2009), who claimed that topic time

and assertion are the two components of finiteness and that Chinese topic time is realized by aspect (Klein et al., 2000). In Chinese, aspectual particles and adverbs comprise the aspectual system. By using the broad morphology method, which refers to combinability with aspectual adverbs or particles, the finite and non-finite verbs in Chinese MVCs can be tested. The diagnostic test shows that the four types of MVCs have different finiteness distinctions. Verbs as subject or direct object are non-finite verbs. In pivotal sentences, in a bare form, V_2 is non-finite while, with particles, it forms part of the finite predicate. In serial-event sentences, V_2 can be understood as a non-finite verb, when interpreted as the purpose of V1, or as part of the compound predicate indicating the consecutive sub-events.

2.3 A Comparison of English and Chinese Finite and Non-finite Distinctions in MVCs

The above sections argue that English and Chinese possess semantic finiteness. The difference between Chinese and English MVCs is related to the salient cue in the finite and non-finite ([+-F]) distinction. Based on the theoretical discussion above, it is argued that finiteness in English MVCs is explicit (morphological finiteness) but implicit in Chinese (semantic finiteness), and that interpretation depends on the context. Tense is obligatory in English finite verbs and, although it can be argued that Chinese mark aspects, not all finite verbs have aspectual markers. The (implicit) finiteness of a verb can only be diagnosed by its combinability with aspectual morphemes or adverbs.

English and Chinese finite and non-finite distinctions share some similarities on the morphological level since, even though Chinese lacks grammaticalized tense, the aspectual particles of finite verbs, in certain conditions, share some degree of

congruence with English inflections. With regard to whether optional aspectual markers are grammaticalized in Chinese MVCs, Dahl (1985) proposed three rules for grammaticalized knowledge: (a) in certain circumstances, it is obligatory to use this kind of information; (b) the morpheme should always closely follow the root; and (c) this particular morpheme cannot be replaced by any other morpheme. This will be discussed further in the following contents, where the similarities and differences between Chinese and English MVCs are examined according to different sentence types.

2.3.1 English [-F] as Subject or Object vs. Chinese Verb as Subject or Object

In sentences with verbs as subject or direct object, compared with the grammaticalized inflections of the finite verbs in English, Chinese also has a finite and non-finite distinction. The aspectual particles "*le, guò, zhe*" in Chinese are allowed in the predicate verb; for expressing the completion of the event, perfective particles are compulsory and can not be changed; and particles are closely combined with the root in sentences with verbs as subject or direct object. English tense markers are compulsory for the predicate verb, closely combined with the root, and non-replaceable. Even though English is marked with tense markers while Chinese with aspect markers, Chinese sentences with verbs as subject or direct object and English non-finite verbs as subject or object sentences are similar at the semantic level. The difference is in the form, as shown in example (9).

(9) a. xuexí   gǎibiàn le   tāde   shēnghuó

      V₁   V₂

      study   change-PFV   his   life

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Studying changed his life.

b. tā   zhèng jìhuá zhe   mǎi   yīliàng   xīn   chē

V₁ V₂

he   be plan-DUR   buy   a   new   car

He is planning to buy a new car.

Example (9) shows that the predicate components are all marked with aspectual information in a. and b., while the other verbs are non-finite.

Table 4 displays the similarities and differences between English sentences with [-F] as subject or object and Chinese sentences with verbs as subject or object.

Table 4 *English Sentences with [-F] as Subject or Object vs. Chinese Sentences with Verbs as Subject or Object*

	English	Chinese
Finite verb (predicate)	V. +tense	V. (bare)/+aspectual markers
Non-finite verb (subject/ object)	V.-ing; to infinitive	V. (bare)

The predicate is the finite verb while the subject or object is the non-finite verb. The difference lies in the forms used to mark the finite and non-finite distinctions. Thus, the problem for L2 learners is how to use the appropriate form in the target language to express their desired meaning.

2.3.2 English [-F] as Object Complement vs. Chinese Pivotal Sentences

As Xing (2004) stated, most of the 180 verbs which can comprise pivotal sentences are not followed by aspectual morphemes and, when morphemes do occur,

they always follow the pivot predicate. Unmovable aspectual adverbs are allowed in V_1 to express its dynamic situation, and do not govern the state of the pivot predicate, so there is no temporal information with the pivot predicate (V_2), and it is non-finite, as in (10) a. Whenever the aspectual morpheme appears after the pivot predicate (V_2), it contains both assertion and temporal information and indicates the completion of the event continuum, and so is finite, as in (10) b. Thus, Chinese pivotal sentences and the English [-F] as object complement differ regarding not only form but also semantic finiteness, as shown in the example (10):

(10)　　a. tā　yǐjīng pài　　Xiǎo wáng　jiē　　　zǒngjīnglǐ

　　　　　　　V_1　　　　　　　　　　V_2

　　　he　　already send　Xiaowang　pick up　boss

　　He has already sent Xiaowang to pick up the boss.

　　　　b. tā　pài　　Xiǎo wáng　jiē le　　　　zǒngjīnglǐ

　　　　　　　V_1　　　　　　　V_2

　　　he　send　Xiaowang　pick up -PFV　boss

　　He had sent Xiaowang and Xiaowang picked up the boss.

In example (10), the pivotal sentence, with or without aspectual particles after V_2 has two different interpretations, while English non-finite verbs as object complement have only one. In Chinese pivotal sentences, with aspectual markers after V_2, both verbs indicate the aspectual information; without aspectual markers after V_2, V_1 is the finite verb, while V_2 has no temporal information and thus is non-finite. Even though the sentence order and verbs' arrangement share some degree of similarity, they differ

with regard to finiteness, so, learners face more problems with regard to how to construct the target-like sentence in order to express a specific meaning, as summarized in Table 5.

Table 5 *English Sentences with [-F] as Object Complement vs. Chinese Pivotal Sentences*

English [-F] as Object Complement		Chinese Pivotal Sentences	
Finite verb	V1. +tense	Compound predicate	V1. (bare/ with aspectual adverb)
Non-finite verb	V2.-ing; to-infinitive		V2. (bare/ with aspectual particles)

2.3.3 English [-F] as Adverbial vs. Chinese Serial-event Sentences

Serial-event sentences in Chinese with bare verbs have more than one interpretation, as noted by Li and Thompson (1981). Particles can be combined either with V_1 to stress the temporal information of V_1 while V_2 as the purpose of it being non-finite, or with V_2 to stress the consecutive events that have occurred.

Compared to the use of English non-finite verbs as adverbial, serial-event sentences have more than one interpretation for understanding the finiteness of the two verbs, as shown in example (11).

(11) wǒ   mǎi   piào   jìn qù

           V_1 V_2

   I   buy   ticket   enter

   I bought a ticket and went in.

   I bought a ticket to go in.

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a. wǒ <u>yǐjīng</u>   mǎi <u>le</u>   piào   jìn qù

I   already   buy   PFV   ticket   enter

I already bought a ticket to go in.

b. wǒ <u>yǐjīng</u>   mǎi piào   jìn qù   <u>le</u>

I   already   buy   ticket   enter   PFV

I bought a ticket and went in.

Particles are freely added to V_1 or V_2, and are not compulsory for the predicate, and so are not grammaticalized. Table 6 shows how English [-F] as an adverbial sentence differs from Chinese serial-event sentences. It also causes problems for learners because of the different finiteness in reminiscent sentences in Chinese and English.

Table 6 *English Sentences with [-F] as Adverbial vs. Chinese Serial-event Sentences*

English [-F] as Adverbial		Chinese Serial-event Sentences	
Finite verb	V1 +tense V2.-ing; to-infinitive	Compound predicate	V1 (bare/ aspectual adverb/ aspectual particles)
Non-finite verb			V2 (bare/ aspectual adverb/ aspectual particles)

In sum, English MVCs include a finite verb with non-finite verbs and, regardless of which position the non-finite verbs occupy, their meanings are identical; that is, without topic time relating them to the real event. MVCs in Chinese refer to constructions where two or more verbs are juxtaposed together without markers, indicating the internal relations of the verbs, whereby the finite verb or non-finite verbs

depend on aspectual markers or pragmatic interpretation.

Chinese verbs as subject or object can be regarded as non-finite, as no aspectual markers can be added to either the subject or object, and so share a degree of similarity with English non-finite verbs as subject or object sentences. The difference lies in the form: English non-finite verbs as subject or direct object should take the form of "-*ing*" or "*to* infinitives", while Chinese verbs as subject or direct object are bare in the form. Chinese pivotal sentences have the same word order as English non-finite verbs as object sentences, but the pivot predicate without aspectual markers is interpreted as unrealized while the pivot predicate with perfective morphemes as a part of the compound predicate indicates the completion of the event continuum. Serial-event sentences have more flexible interpretations, and aspectual particles can appear after either V_1 or V_2. V_2 may be understood as the purpose of V_1 without temporal information. It can also be interpreted as the consecutive event in the same temporal category with V_1.

These sentence types show that the cross-linguistic differences between Chinese and English MVCs vary on both the morphological and syntactical level. These cross-linguistic differences may result in different problems for learners from a semantic finiteness language background when learning a morphological finiteness language, and vice versa.

2.4 Chapter Summary

This chapter discussed the typological differences between Chinese and English MVCs and the essential grammatical property of finiteness in these constructions. MVC is a kind of language phenomenon that reflects a series of related sub-events in

the real world. It refers to two or more verbs that are juxtaposed, without pauses or conjunctions. English and Chinese MVCs differ typologically. By defining MVCs, it was possible to compare in detail four types of English sentences with non-finite verbs and four types of Chinese sentences with two or more juxtaposed verbs without conjunctions or pauses. The clear morphological difference between English finite and non-finite verbs not only indicates the dependent relationship between the two verbs but also connects the series of events with certain temporal information. Chinese MVCs appear in sentences with verbs as the subject or direct object, pivotal sentences, and serial-event sentences. The four types all take the same form of (NP) V (NP) (NP) V (NP), but the meanings can be interpreted differently.

Based on Klein's theory of semantic finiteness, it was argued that implicit semantic finiteness exists in Chinese MVCs and that aspectual markers serve as the diagnostic tool for testing the finiteness of verbs, although no uniform finite and non-finite distinction exists between the four types of MVCs. Chinese sentences with verbs as subject or direct object share similarities with English non-finite verbs as subject or object, since verbs as subject or object in both languages are non-finite and the difference lies in the (arbitrary) form employed to express non-finiteness. The multiple verbs in Chinese pivotal sentences and serial-event sentences are understood to serve as compound predicates which lack clear finite and non-finite distinction, and the aspectual morpheme tends to follow the whole compound predicate. These sentences are reminiscent of English sentences with non-finite verbs as object complement or adverbial, but differ from these with regard to the interrelationships between multiple verbs. Given the varied cross-linguistic differences discussed in this chapter, learnability problems are predicted, which are likely to vary across different types of MVCs, due to cross-linguistic influences.

In sum, this chapter defined MVCs, and demonstrated why they should be studied, how they are composed in typologically distant languages such as English and Chinese. Furthermore, why finiteness is important in MVCs, what are the essence of finiteness, how different kinds of finiteness are reflected in languages were also explained. Finally, based on the theories of MVCs and finiteness a detailed comparison between English and Chinese MVCs was made.

3. Chapter Three Literature Review on Learning MVCs in L2 and Cross-linguistic Influence in L2 Acquisition and Processing

There has been a lot of theoretical research on multi-verb structures, but only a handful of these have investigated the possible influence of related syntactic structures in Chinese on the acquisition of English MVCs. Conversely, to the best of our knowledge, even fewer studies have focused on how MVCs in English influence the acquisition of similar sentence structures in Chinese L2. Most of the previous studies have been isolated error analyses and employed relatively limited research methods, mainly focused on learners' production. On the basis of cross-linguistic comparisons between English and Chinese MVCs, with an illustration of the key terminology of finiteness, the aim of the current research is to explore how the differences between the finite and non-finite distinctions in Chinese and English affect the acquisition and processing of MVCs in the L2 (Chinese and English). In this chapter, I will briefly outline the previous work on the acquisition of MVCs in the L2, and summarize relevant studies in the field of cross-linguistic influence on both L2 acquisition and processing.

3.1 Previous Studies on Learning MVCs in L2

3.1.1 Learning English MVCs

Most previous research on the acquisition of English MVCs has focused on Chinese ESL learners' production of non-finite verbs in English L2. The methodology comprises error analyses of learners' compositions, comparisons of different tests (multiple-choice tests vs. writings) and corpus analyses.

For example, S. Yang and Huang (2009) argue that different syntactic structures influence Chinese learners' acquisition of the English tense/aspect system. They surveyed 452 compositions written by five levels of Cantonese speakers of English, whose written language was Mandarin. The five levels of participants included primary school students (age: 10), grade 1, 3, and 5 middle-school students (age: 12-16) and college students (age: 19). The researchers investigated eight types of sentence with two verbs, which are, respectively, type I: subject+ auxiliaries+ V. +other phrases (e.g., *I could't sleep at night*), type II: subject+ V.+(other phrases) +infinitives (e.g., *I wanted to go home*), type III: clause + clause (coordinate) (e.g., *I was drawing a picture and Mary was writing a letter*), type IV: subject+ V. + clause (e.g., *she said that her mother was not feeling very well*), type V: clause+ V. (e.g. *what he wanted was very obvious*), type VI: clause + clause (subordinate) (e.g., *Mary was late, because she was not feeling very well this morning*), type VII: clause with embedded relative clause (e.g., *The book I bought yesterday is very interesting*), type VIII: subject +V. +(other phrases) + V. (e.g., *she walked to the couch and sat down*). It was found that the L2 learners were better at marking the tense and aspect of the first verb rather than the second verb; however, in type II, with V_1 as the predicate verb and V_2 as the infinitive, the L2 learners tended to omit the past tense of the finite verb, and allocated the past tense instead to the non-finite verb (e.g., *I go to Nanjing attended the meeting*). They argued that this was probably because of the similar sentence patterns in their L1. This type of error was only prominent among low-proficiency learners (primary school, grade 1 and 3 middle-school students). It was thus concluded that the syntactic structures (different sentences with two verbs including both mono-clauses and multi-clauses) influenced low-proficiency Chinese ESL learners' usage of tense/aspect in English, and one interpretation was the influence from the L1 sentences. Even though

the findings on the influence of syntactic structures on L2 temporal acquisition had some implications for future studies, this research suffered from the limitation that no systematic comparisons exist between Chinese and English related sentences, and there was no further discussion on whether it was the transfer of the form or the temporal meaning.

A different conclusion was drawn from Chang (2005)'s study, who investigated Chinese ESL learners' acquisition of English finite and non-finite distinctions. He examined compositions (on the same topic) written by 102 undergraduates and hypothesized that, if Chinese ESL learners cannot distinguish [+-F], they will randomly use finite and non-finite verbs, which means that there would be [-F] forms in [+F] positions and vice versa. The results showed that, in finite positions, a high percentage of learners did not use inflected forms (e.g., *last year, my father say…*) but, after auxiliaries, modal verbs, and *to*, inflected forms were seldom used (e.g., *can made*). Thus, Chang argued that, although inflections of finite verbs were missing in their English to a considerable degree, Chinese learners indeed possessed syntactic knowledge of [+-F]. Chang also found that the participants demonstrated a knowledge of finite verbs, since they could use overt nominative subjects in finite clauses consistently (e.g., *they find that…*), place negator and VP adverbs on the left of thematic verbs (e.g., *I don't like it*), and mark agreement correctly (e.g., *she is good at…*). Based on these findings he argued that the interlanguage syntactic system and mechanism of feature checking remain unimpaired in Chinese learners of English. This research provides evidence that Chinese ESL learners may possess a knowledge of finite and non-finite distinctions, but the argument that [+-F] is used randomly if it is impaired is not sound because learners with an uninflectional background are likely to use bare verbs as both [+F] and [-F] when they have no knowledge of [+-F]. Thus,

the question of whether Chinese L2 learners of English can acquire finite/non-finite distinctions in English requires further investigation.

X. Fang (2014) undertook a corpus-based study among L2 English learners with different L1 backgrounds (French, German, Chinese) and found that proficiency made a difference to the frequency of their use of non-finite verbs among these ESL learners. Low-proficiency Chinese learners (middle school students) and intermediate-proficiency learners (non-English college students) underused the *-ing* clauses in general, while high-proficiency learners (English majors) used them comparatively more frequently; low- and intermediate-proficiency learners underused the *-ed* clauses while high-proficiency learners overused this form in general; low-proficiency learners underused while upper-intermediate proficiency learners all overused infinitive clauses of verbs in general. Compared with the French and German ESL students, the difference between Chinese ESL learners and native speakers was more significant. In short, the low-proficiency Chinese learners tended to underuse non-finite forms, while high-proficiency learners displayed over usage. This research demonstrates the important role of L2 proficiency in the production of non-finite forms, but no further explanation was provided regarding why Chinese ESL learners differed more from English natives in comparison with learners from other language backgrounds.

There have also been several pedagogically-based researches; for example, low-proficiency Chinese ESL learners (middle school students) were found to perform better on multiple-choice rather than written production tasks (W. Shi, 2010; S. Liu, 2012; L. Yang, 2012). It has been argued that it is easier for Chinese ESL learners to comprehend English MVCs than to produce them, although it is unclear whether the

underlying cause is a developmental or a cross-linguistic issue.

Based on the theory proposed by Hu et al. (2001), that Chinese has no finiteness distinctions, Gisborne (2009) examined "the distribution of finiteness in Hong Kong English (HKE) in order to establish whether it can be argued that there is a lack of finiteness in the variety which reflects the lack of finiteness in Sinitic languages" (p. 151). Gisborne believes that there are four main areas which can show English finiteness distinctions: having an overt subject; being independent predicates; encoding a speech act function; and selecting either finite or non-finite complement. Among these four diagnostics, Gisborne chose the last criterion and searched for the complement usage after "*guess*", "*realize*" and "*suggest*" in the International Corpus of English (ICE-HK). "If there is a perfect correlation between the complementation of matrix verbs in standard varieties of English and their correlates in HKE, then HKE maintains a finiteness contrast" (Gisborne, 2009, p.157). The results showed that there were no sentences with "realize" non-finite complements in the corpus, but several tokens of "suggest" non-finite complements. He concluded that "the lack of finiteness is not systematic in HKE. For sure, I have found several examples which lack this morpho-syntactic feature distinction, but it is not at all clear that the grammar has settled on one typological pattern over another" (Gisborne, 2009, p.166).

In sum, no consensus was reached on whether the lack of morphological finite and non-finite distinctions influences the production of English MVCs in the previous studies. Several researchers have argued that the syntactic structures in the L1 influence low-proficiency Chinese ESL learners' acquisition of English tense/ aspect (e.g., S. Yang & Huang, 2009), and Chinese learners of English have less native-like production of non-finite verbs in comparison with learners from other backgrounds,

such as French or German (e.g., X. Fang, 2014), all of which indicates the potential influence of a lack of morphological finite and non-finite distinctions in Chinese. Other researchers found no evidence of Chinese ESL learners' lack of syntactic knowledge of an [+-F] distinction in their production because, in the syntactic position, where non-finite verbs should be used, inflected forms were seldom used and no systematic confusion of finite and non-finite complements after "*guess*", "*realize*" and "*suggest*" occurred (e.g., Chang, 2005; Gisborne, 2009).

As stated above, the different conclusions drawn from these studies might be attributed to the different proficiencies of the test groups and the different types of sentences where non-finite verbs function in different syntactic positions. To demonstrate clearly whether and how the lack of the morphological finite and non-finite distinctions in Chinese influence Chinese learners' acquisition of English finite and non-finite distinctions, it is necessary for the test groups to have a broader range to show the possible influence of the variable—the L2 proficiency and the investigated sentences with a non-finite verb are classified by comparing them with reminiscent Chinese sentences. Various research methods, such as the big-scale interlanguage corpus, grammatical judgments, and real-time tests, are also needed to examine the different aspects of possible L1 influence.

3.1.2 Learning Chinese MVCs

In the opposite direction of learning Chinese as the L2, since one of the characteristics of Chinese is its lack of overt morphological markers, learners from a morphological overt background (English) cannot rely on the morphological tense to interpret the grammatical relations in MVCs. They may avoid the usage of sentences that do not exist in the L1 (e.g., Jin, 1994; W. Zhou, 2009; Sun, 2008), overuse the

similar-to-L1 structures (e.g., Zhao, 2006), or equate a Chinese grammatical form to an L1 form (e.g., L. Jin, 2009; Y. Huang & Yang, 2004) in the acquisition of Chinese sentences.

The difficulties associated with learning Chinese-specific sentences[5], such as pivotal or serial-event sentences, have been investigated by researchers (e.g., W. Zhou, 2009; Sun, 2008). In W. Zhou (2009)'s study, it was found that, in the Foreign Students' Chinese Interlanguage Error Corpus (W. Zhou & Xiao, 2004) of 900,000 words, 1,321 sentences (including 1,173 correct usage and 148 misusages) were pivotal sentences while Chinese native speakers produced 2,171 pivotal sentences in the native Chinese speakers' corpus with similar word counts. This shows that Chinese as L2 learners underuse these sentences. The usage of pivotal sentences increases in accordance with school grade, which indicates the role of L2 proficiency here. The errors tended to be the omission of a pivot or pivot predicate, the redundancy of aspectual morphemes (*le, zhe, guò*) after the predicate, incorrect word order and non-target-like word collocation.

The underuse of serial-event sentences was also found (Sun, 2008). L2 learners of Chinese used 1,651 serial-event sentences in the Foreign Students' Chinese Interlanguage Error Corpus (W. Zhou & Xiao, 2009) of 900,000 words, while the native Chinese speakers used 1,930 serial-event sentences with the same words count. It emerged that L2 learners overused the directional verbs, such as *dào* (arrive), *qù* (go), *lái* (come): among the 1651 serial-event sentences, 1,024 contained directional verbs (53.06%). In contrast, native Chinese used 1,930 serial-event sentences, of which only 598 contained directional verbs (30.98%). Learners' usage of serial-event

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[5] Chinese-specific sentences refer to those without an English counterpart or which are typologically different, such as pivotal sentences, serial-event sentences, and resultative sentences, "bei" sentences, "ba" sentences, etc.

sentences increased in line with their L2 proficiency. Their errors tended to be incorrect word order, redundant verbs, the omission of verbs and non-target-like collocations.

As stated above, the problems associated with the acquisition of pivotal and serial-event sentences noted in the previous studies stressed learners' underuse, and the misuse of forms included omission, redundancy, incorrect word order and non-target-like collocations. These researches provide us with general information about the difficulties and misuse in the L2 acquisition of pivotal and serial-event sentences, but the limitations are a lack of further discussion about the possible reasons for each type of error, and the neglect of the learners' L1 backgrounds. If and how the morphological finite and non-finite distinctions in the L1 influence the acquisition of Chinese compound predicates remains unclear. In further exploration, a comparison of the learners' interlanguage with the L1 and the L2 is needed together with an investigation of the usage of aspectual markers in these constructions which are used to interpret the internal relations of multiple verbs.

Few researches have been found on the L2 acquisition of other types of MVCs, which are sentences with verbs as the subject and sentences with verbs as the direct object, which share many similarities with their English counterparts. Many previous Chinese L2 studies focused on sentences which are typologically different from English, such as the topic prominent sentences (sentences with topic+ comment) (e.g., Green, 1996; Yip & Matthews, 1995; Yip, 1995; Xiao, 2002; L. Yang, 2008; B. Yuan, 2017), in-situ *wh*-questions (e.g., Matthews & Yip, 2003; B. Yuan, 2007), or resultative constructions (e.g., B. Yuan, 2010). However, even given the similarities in terms of word order and finite and non-finite distinctions, differences in the forms of

finite and non-finite verbs may also cause learners problems, so it is a part in the investigation of L2 acquisition of MVCs.

In general, this section reviewed some of the previous studies on the acquisition of MVCs in English and Chinese as the L2. Previous studies provide information on the learning difficulties or problems associated with producing MVC production: the main misuses were the morphology of non-finite verbs for Chinese ESL learners in the acquisition of English MVCs, under usage and lexis errors, including omission, redundancy, word order, and collocation, in the acquisition of Chinese MVCs. The previous studies mainly focused on the errors in the interlanguage, and the research methods were limited to the learners' production, such as their compositions, corpus, and translations. Neither a comprehensive comparison between the source and target language nor the further interpretation of the errors has been undertaken. Overall this, therefore, calls for the further investigation of the possible sources of these errors.

3.2 Cross-linguistic Influences in L2 Acquisition

Cross-linguistic difference between the L1 and the L2 is an important factor in second language acquisition. It was first proposed using the term "language transfer". "Transfer is the influence resulting from the similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired" (Odlin, 1989, p. 27). By the 1980s, some researchers were choosing to use the term "cross-linguistic influence" (CLI) to replace "transfer", since the latter is mainly associated with behaviorism (Jarvis & Pavlenko, 2008). In this thesis, transfer and cross-linguistic influence will be used interchangeably as a neutral term to refer to the phenomenon in question.

In the L2 acquisition of grammar, differences in forms and meanings between the L1 and L2 make it difficult to map the meanings to forms, and thus L1 transfer occurs in the L2 learners' interlanguage. Interlanguage refers to the language system that L2 learners develop, which is neither the target language nor the L1 (Selinker, 1972; Vanek & Selinker, 2017). The theory of form-meaning mapping demonstrates the learning difficulties associated with the acquisition of the L2 grammar, explains why transfer occurs in the L2 grammatical acquisition and can help to predict whether there will be a transfer and, if so, whether this will be on the morphological or the morpho-syntactic level.

3.2.1 Form-meaning Mapping

DeKeyser (2005) has divided grammatical difficulties into three factors: the complexity of form, the complexity of meaning, and the complexity of the form/ meaning relationship.

DeKeyser defined difficulty of form as "assuming the learner knows exactly the meanings that need to be expressed, the difficulty of the number of choices involved in picking all the right morphemes and allomorphs to express these meanings and putting them in the right place" (2005, p. 6). The problem with forms is basically linked to morphology, especially for the acquisition of rich morphology for a native speaker of a language with poor or no morphology. "Everything else (such as semantic difficulty) being the same, the more that needs to be expressed overtly, the more choices need to be made about morphemes, allomorphs, and their position" (DeKeyser, 2005, p. 6). Slabokova (2009) assessed the difficulties associated with syntax, semantics and morphology and concluded that functional morphology is a bottleneck in second language acquisition, which is more difficult than the acquisition of syntax,

the syntax-semantics interface, the syntax-discourse interface, and the semantics-pragmatics interface. For example, in Lardiere (1998)'s longitudinal study with a Chinese learner of English, it was found that the research object produced a very low-rate of inflectional verbs, even though other, related features, like word order and subject case assignments, were native-like. It was thus concluded that "the syntactic and morphological development are independent" (p. 1), so even when the meaning and syntactic structures of the sentence are known, the morphology can still prove difficult. Jiang (2004) separates the problems of forms and meanings, arguing that the omission of the plural "-s" from nouns by Chinese ESL learners is caused by an insensitivity to morphology rather than a misunderstanding of the meaning.

The meaning difficulty mainly refers to the difference in semantic expression between the L1 and the L2. There exist two types of meaning problem: the first is that the semantic systems differ in the L1 and the L2; for example, perfect aspect markers in English and Chinese, such as "*guò*" in Chinese, imparts the additional meaning of a result state (J.-W. Lin, 2006). The second type is when equivalent notions may have an overt expression in the L1 but the covert expression in the L2 or vice versa, like determiners in English and Chinese. It has long been noted that Chinese learners of English have difficulties in acquiring English morphemes, which have no equivalent notions in Chinese, such as the research on the third person –*s* (e.g., DeKeyser, 2000; Johnson & Newport, 1989) and the past tense -*ed* (e.g., Hawkins & Liszka, 2003; Lardière, 2007; Y. Yang & Lyster, 2010). Jiang et al. (2011) studied advanced Russian and Japanese ESL learners' acquisition of English grammatical morphemes, i.e., plurals, that do (in Russian) or do not (in Japanese) have a counterpart in their language (L1). It was argued that two factors (the absence of the morpheme in the L1 and the lack of the concept that the morpheme encodes) cause the acquisition difficulty. "The

acquisition of such a morpheme would require much more learning, as its related meaning is not grammaticalized in the learner's L1, which means that the related meaning is not part of the routinely activated meanings in the learner's mind" (Jiang et al. 2011, p. 959).

Last but not least, DeKeyser (2005) addressed the importance of form-meaning mapping: "form-meaning mapping can still be difficult if the link between form and meaning is not transparent" (p. 7). He pointed out that three factors (redundancy, optionality, and opacity) affect the transparency of form-meaning linking. "Redundancy means that the form at issue is not semantically necessary because its meaning is also expressed by at least one other element of the sentence" (DeKeyser, 2005, p. 8) For example, a morphological suffix after verbs can be redundant in expressing person and number because the subject is explicit so the information about how many people there are is clear as a subject. A suffix may also be redundant in expressing tense, if adverbs or other lexical means can help to determine the time. If one form problem is semantically redundant, it is not simply a form problem but a form-meaning mapping problem. Optionality means that the presence or absence of a certain property has the same meaning, apart from in the case of subtle pragmatic factors. DeKeyser defined opacity as "when a morpheme has different allomorphs, and at the same time, it is homophonous with other grammatical morphemes" (2005, p. 8). To simplify this definition, different forms may have the same meaning, and different meanings may be in the same form. A typical example is the –s in English, which means both the third person singular and the plural of nouns.

Form mapping difficulties exist in the L2 acquisition of English MVCs. In Chinese MVCs, verbs as subject or direct object are non-finite verbs and, unlike

English non-finite verbs, they lack morphology like "-*ing*" and "*to*". Therefore, for Chinese ESL learners, the "*ing*" or "*to*" are redundant for the expression of non-finiteness. The learning problem lies in the choice of picking the correct morphemes and allomorphs to express these meanings and putting them in the right place, so there arises a one-meaning-(non-finiteness)-to-many forms (expressions: *to do/ doing*) difficulty.

Meaning mapping difficulties also exist in Chinese and English finite and non-finite distinctions with regard to MVCs. The Chinese morpheme "*le*" is an aspect marker that indicates the perfective status of the verb and "presents a situation in its entirety, as an event bounded at the beginning and the end, and without reference to its internal structure" (Klein et al., 2000, p. 724). The English morpheme "-*ed*" is a tense marker that can only be the suffix after finite verbs, and shows that the event precedes the time of the utterance. In Chinese MVCs, "*le*" as an aspect marker can occur after the pivot predicate in pivotal sentences or after the second predicate in serial-event sentences. Additionally, the aspectual adverb "*yǐjīng*" (already) in Chinese is an unmovable adverb, indicating the dynamic status of the verb rather than the whole sentence. In comparison, the English adverb "*already*" as a temporal adverb does not serve as a cue to distinguish finite and non-finite verbs. It is movable and indicates the temporal information of the whole sentence.

In addition to form mapping in sentences with [-F] as subject/object and the meaning mapping of the cue to distinguish [+-F], Chinese sentences with compound predicates pose more challenges related to form-meaning mapping. In contrast to the compound predicates in Chinese pivotal sentences or serial-event sentences, the multiple verbs in the reminiscent English sentences (non-finite verbs as object

complement/adverbial) have a morphological finite and non-finite distinction and the non-finite verbs have several forms (*to* infinitives, *-ing*), so Chinese ESL learners should not only construct the meaning of [+-F] in reminiscent English sentences but also map the meaning with the correct forms. In the opposite direction, Erbaugh (1978, 1992) suggested that "learning less" (i.e., from complex forms in L1 to simple forms in L2) is actually more difficult. In the acquisition of Chinese MVCs, optionality and the opacity of the aspectual markers in interpreting multiple verbs also pose difficulties for learners whose L1 has an explicit and compulsory morphological finite and non-finite distinction. The aspectual morphemes and adverbs as the marker for interpreting the relations of multiple verbs are not obligatory in Chinese MVCs. In many cases, the multiple verbs take the form of bare verbs. Without a compulsory marker to distinguish the multiple verbs, the interpretation of the functions of verbs may be difficult for L2 learners. In addition to optionality, "*le*" is also opaque, as it can either be a verb-final "*le*", indicating the perfective state of verbs, or a sentence-final "*le*", expressing the completion of the event or change of situation. Apart from that, structures with compound predicates do not exist in English, so English CSL learners will have to construct a new concept in describing the meaning of multiple verbs.

In short, the complexity of non-finite forms, the meaning mapping of temporal information, and the form-meaning mapping of MVCs between English and Chinese may lead to learning difficulties. L2 learners are likely to transfer the forms or the morpho-syntactic features from their L1 to their L2. In the next section, a brief introduction to cross-linguistic influences in the L2 acquisition and the previous findings in this field will be presented.

3.2.2 Transfer Analysis and the Development of Cross-linguistic Influence Studies

Transfer analysis has been used in studies of cross-linguistic influences. The term "transfer analysis" has been developed from contrastive analysis and error analysis. "Contrastive analysis is the systematic comparison of two or more languages" (Odlin, 1989, p. 165). Error analysis refers to the comparison of the learner's interlanguage with the target language. Interlanguage is the linguistic system used by second language learners who are in the process of learning a target language (Selinker, 1972, 1992). Developing from comparative analysis and error analysis, transfer analysis denotes an investigation of the discrepancy between the target language and interlanguage with regard to the cross-linguistic influence (Chan, 2004).

Yip (1995) notes that "prior knowledge and experience of one or more languages often conditions the way we make sense of any new experience of language learning. Well-developed, pre-established concepts and mental structures together with automatized cognitive processes often hinder restructuring and new development" (p. 14). Some researchers summarized the role of L1 transfer as a composing and compensating strategy which can help the learners to originate, develop, compose, and organize thoughts in the L2 production (e.g., Moattarian, 2013).

The study of cross-linguistic influence can be viewed as a developing process which is divided into several phases, from the recognition and identifying the cross-linguistic influences to the physiological test in the human brain (see Table 7). Since the beginning of phase 1 in Weinreich (1953)'s examination of numerous types of transfer, the research in this field has developed significantly. The next phase usually developed while the previous phase was still ongoing, and there were still some studies on the first phase now. Even though phase 4 is underway, much of the current focus

is still on phase 3 because theoretical accounts and models specifically designed to explain CLI require further empirical testing.

In the four phases of transfer research, even though many typological differences have been examined, and the transfer effects have been observed in different types of sentence structures, there remain certain linguistic phenomena which have received relatively little attention, such as the multi-verb constructions. The current research uses the transfer analysis method to test the hypothesis predicted by the form-meaning mapping difficulties associated with Chinese and English MVCs and investigate whether or not the transfer is bidirectional, and when and what types of transfer occurs in the acquisition of MVCs in the L2. Furthermore, I also explore how cross-linguistic differences influence the L2 learners' online processing of the MVCs and test the hypotheses predicted by the processing models, which will be described in detail in section 3.3 CLI of L2 processing.

In sum, several of the representative ideas in the debate on how to distinguish between finite and non-finite verbs in Chinese have been outlined above. Chinese lacks inflectional morphology and tense and has a flexible word order, so it relies heavily on semantics, pragmatics, information structure, and discourse. Based on the conventional division between morphology and syntax, it is difficult to determine with clarity whether or not finiteness exists in Chinese, even though many researchers have addressed this question. The only way to view finiteness from a cross-linguistic perspective is to expose its function within the specific languages under investigation (here, Chinese and English) and to explore its nature from a semantic perspective.

Table 7 *Phases of Transfer Research (Jarvis & Pavlenko, 2008, p. 6)*

	General Description	Primary Research Concerns
Phase 1	Recognition and investigation of the phenomenon as a factor— as an explaining or intervening or independent variable—that affects other processes (such as second language acquisition)	• Identifying cases of transfer • Defining the scope of transfer • Quantifying transfer effects
Phase 2	Investigation of the phenomenon as a primary process itself—as an explaining or dependent variable—that has its own set of explanation or independent	• Verification of transfer effects • Identifying causes of transfer • Identifying constraints on transfer • Investigating the selectivity of variables transfer • Investigating the directionality of transfer effects
Phase 3	Development of theories designed to explain the phenomenon in relation to social, situational, and mental constraints, constructs, and processes	• Development of theoretical models that explain how, why, when, and what types of CLI occur • Development of specific, testable hypotheses concerning CLI • Empirical testing of these hypotheses
Phase 4	Development of a precise physiological account of how the phenomenon takes place in the human brain	• Detailed mapping of the brain in relation to how language is acquired, stored and processed • Accumulation of direct evidence of cross-linguistic neurological connections in a person's long-term memory—of how such connections are formed, changed, and maintained • Accumulation of direct evidence of how languages are activated in the brain and of how a person's knowledge of one language can be activated and interfere with his or her use of another language

3.2.3 Previous Studies on Morpho-Syntactic Transfer in L2 Acquisition

Syntactic transfer has been found in a vast range of studies; for instance, Hertel (2003) found that Spanish L2 learners with an English background tended to transfer the subject-verb word order to all Spanish sentences, including subject-verb sentences and verb-subject sentences. During a contextualized production task, the researcher noticed that L2 proficiency is an important factor in L1 transfer, as reflected by lower-proficiency learners' transferal of the SV order of English for all structures, while intermediate learners showed a decline in the production of L1-resembling structures and advanced learners showed a sensitivity to the effects caused by different word order in the target language, even though overgeneralization still existed in the discourse (Hertel, 2003). Sabourin (2001) examined the property of grammatical gender agreement and found that German and Romance learners of Dutch with grammatical gender did not differ from natives while English learners of Dutch performed significantly worse. Thus, an L1 facilitating effect was found to be that learners from an L1 with grammatical gender tended to grasp this property more easily in the L2, but the grammatical gender had to be similar with the target language.

Helms-Park (2003) studied the resultative serial verb constructions (RSVCs) in Vietnamese and found that the Vietnamese ESL learners transferred the resultative serial verb constructions to their L2 English or Creole. In these studies, picture-based production tests, choice of verbs tests and grammatical judgment tests were used to test the L2 learners. English as L2 learners from a Vietnamese background produced a lot of RSVs which resembled their native language from the lexicosemantic aspect. In contrast, English as L2 learners from a Hindi-Urdu background did not produce a structure of this kind. In this research, L2 proficiency was also an important factor in

dictating which kind of transfer occurred: low-level learners had a large number of resultative-verb structures, such as "*cook butter melt*". Causative sentences composed of "*make*" were evenly distributed among the various levels of language learner, e.g., "*make broken*". It was concluded that "the transfer of processes in the two contexts are congruent in things (often resulting from the exigencies of communication, limited access to the TL, and linguistic convergence), the processes diverge because of differences in target norms and input conditions" (Helms-Park, 2003, p.212).

There have also been studies on the influence of Chinese syntax on L2 English: for instance, relative clauses were investigated by Matthews and Yip (2003); copula, placement of adverbs, expressing the existential or presentative function, relative clauses, and verb transitivity in English L2 by Chan (2004); and topic-prominent sentence structures by Green (1996), Xiao (2002), Yip and Matthews (1995), Yip (1995) and L. Yang (2008).

Yip (1995) studied four Chinese interlanguage structures, including pseudopassives, ergative constructions, pseudo-tough movement, and existential constructions, among 20 Chinese ESL learners from Taiwan. She found both L1 transfer and universal developmental features in language acquisition and concluded that the extent of learnability in the L2 is closely related to and can be explained by the structural contrasts between the L1 and the L2 (Yip, 1995). The subset and uniqueness of the language caused the under- or overgeneralization of the target constructions, and so led to the learnability problems. "The interaction between syntax and semantics plays a crucial role in the formulation and resolution of these learnability problems" (p. 1).

Chan (2004) found evidence of syntactic transfer in L2 English in five different

syntactic structures in Chinese including the copula, placement of adverbs, expressing the existential or presentative function, relative clauses, and verb transitivity. These comparisons were all related to the contrast between the Chinese and English sentence structures. Through self-reporting during individual interviews, translation (with and without prompts), and grammaticality judgment tasks, it was found that 710 Chinese ESL learners in Hong Kong of different proficiency levels tended to think first in Chinese and then compose their sentences in the target language, so many of their sentences resembled the common structures in their L1. It was argued that the more complex the structure of the sentence, the more syntactic transfer occur, and the lower the learners' L2 proficiency, the more syntactic transfer occurs. Apart from the L1 transfer, other factors, such as developmental sequences, similar but correct structure patterns found in the L2, and avoidance behavior had various degrees of influence on their L2 learning. Chan (2004) pointed out that the limitations of this study lay in the translation of these sentences, which was too unnatural because it was a direct translation from one language to another, originating from the L1.

In contrast to the large body of evidence related to morpho-syntactic transfer from Chinese to English, the transfer of English structures to Chinese is more controversial. For example, in B. Yuan (1998)'s study on Chinese reflexives, allowing both long-distance and the local antecedent (e.g., "*Zhangsan$_i$ renwei Lisi$_j$ xiangxin ziji$_{i/j}$.*" (Zhangsan think Lisi trust self)), English learners of Chinese with L1 only allowing a local antecedent (e.g., "*John$_i$ thinks Bill$_j$ trusts himself $_{*i/j.}$*") have difficulties in acquiring long-distance antecedents. This difference is more pronounced when compared with Japanese learners of Chinese, whose L1 also allows both long-distance and local antecedents. This shows that the similarities between Chinese and Japanese may have facilitated the acquisition of long-distance antecedents. However, B. Yuan

also argued that not everything can be explained by L1 interference because no differences in the acquisition of the free orientation of "*ziji*" were found among Japanese and English learners of Chinese (e.g., "*mama gaosu nueri PRO$_i$ buyao jiaoguan ziji$_i$*", (mother tell daughter not spoil self), the mother told her daughter not to spoil herself), which is probably a developmental problem due to misleading input.

Further evidence is provided by B. Yuan and Zhao (2005), who studied resumptive pronouns (RPs) in Chinese relative clauses. These resumptive pronouns are not allowed in English relative clauses but are acceptable in Chinese (see example 12).

(12) *The beggar [(whom) you gave him some money yesterday] was arrested this morning.

Ni zuotian gei (ta) qian de nage qigai jintian zaoshang bei bu le.

You yesterday give him money DE that beggar today morning by arrest ASP. (B. Yuan & Zhao, 2005, p. 219)

The study tested five advanced English learners of Chinese whose L1 requires gaps in relative clauses and five advanced Palestinian learners of Chinese whose L1 allows both RPs and gaps, using a sentence acceptability judgment task. The results showed that English learners generally accepted gaps in Chinese as in their L1, while Palestinian learners of Chinese "not only correctly accept RPs in indirect object position and genitive position but also incorrectly accept RPs in subject and object positions" (B. Yuan & Zhao, 2005, p. 231). The authors argued that it might not be L1 transfer that leads to the difficulties of English learners, but it may be the default

setting during the initial stage of presuming Chinese to be a typologically distant language and setting the gaps in all positions of the relative clauses.

Even though some studies have found that learning Chinese syntactic structures that do not exist in the L1 is difficult, such as the thematic structures of Chinese resultative compounds (e.g., "*ma-ku*" (scold-cry)), in which the post-verbal NP is the theme of the activity predicate and the agent of the result predicate (B. Yuan, 2010), some empirical studies show that the L1 and L2 contrast does not necessarily lead to L1 transfer (e.g., B. Yuan, 2004, 2007, 2015). B. Yuan (2007) argued that "L1 transfer is not everywhere at the initial stage although it is a common phenomenon in L2 acquisition" (p. 290). For example, in the acquisition of Chinese negation (*bù*), the French, German and English learners did not encounter many learning difficulties, even though French, German and English differ regarding the position of negation markers (B. Yuan, 2004).

In general, there exists considerable evidence that the L1 and L2 contrast will lead to the learning difficulties or L1 morpho-syntactic transfer in L2 acquisition. Similarities between the L1 and L2 were found to facilitate L2 acquisition. L2 proficiency also plays an important role; namely, the lower the L2 proficiency, the more L1 transfer occurs. However, there are also studies showing that L1 transfer during the initial stage is not universal. It is thus important to explore why, when, and how L1 transfer occurs, and what kind of property is transferred. The L1 transfer may concern the specific property and the specific features in the L1 and L2, and it can be a relative linguistic phenomenon.

As well as the syntactic transfer that has been widely observed in Chinese learners' acquisition of English sentences, the morphological transfer has also been discussed

at length in the previous studies. L2 learners may transfer forms from their native language into their L2 production, since "problems of adult L2 learners relate to the mapping of specific morphological forms to abstract categories" (Prévost & White, 2000, p. 129). As learners from an uninflectional background, Chinese ESL learners have long been observed to have difficulties in producing certain kinds of inflectional morphology, such as plurals. Even though there was disagreement in the reasons of learners' failure to produce the inflectional morphology, the idea that some "non-target-like functional morphology is a problem at the surface rather than a problem in the syntactic representation has been proposed by different authors in different ways" (Campos, 2009, p. 212).

To sum up this section, cross-linguistic influence refers to the influence resulting from the similarities and differences between the L1 and L2. On the one hand, verbs as subject or direct object in Chinese and English MVCs share the same meaning of non-finiteness but have form differences: they are bare verbs in Chinese, *to-infinitives* or *-ing* in English, so these "one to many" form differences may lead to the learning difficulties and morphological transfer in L2 acquisition. On the other hand, the temporal markers of finite verbs in the two languages convey different meanings, and the form-meaning mapping between pivotal or serial-event sentences and [-F] as object complement or adverbial sentences is complex. Form-meaning mapping problems raise the learnability questions in the acquisition of MVCs in the L2, and cross-linguistic influences were predicted. On the basis of contrastive analysis and error analysis, transfer analysis is an approach to investigating the interlanguage and L2 discrepancies that would result from L1 interference. Studies on L2 phonetics and phonology, speech perception, lexicons, reading, and pragmatics all foregrounded the function of cross-linguistic influences.

The morpho-syntactic transfer has been observed through transfer analysis. Word order, gender agreement, resultative verb constructions, and causative sentences from the L1 were found to transfer to the L2. Chinese sentence structures, like topicalization, passive, copula, placement of adverbs, and relative clauses, were found to transfer to English in the learner's interlanguage. L2 proficiency plays a crucial role in what kind of transfer may occur, and syntactic transfer is more likely to occur among low proficiency learners. However, there was also evidence that Chinese properties, like negation, in-situ *wh*-questions, which differ from the learners' L1, do not pose difficulties in L2 learning. It was thus concluded that L1 transfer is universal in the initial stage of L2 acquisition, and may be a relative phenomenon depending on the specific properties in the target and source languages.

3.3 CLI in L2 Sentence Processing

The studies on cross-linguistic influence have shifted towards "studies on comprehension and cognitive construction of surrounding reality mediated by language, taking advantage of modern technology in psycholinguistic and neurolinguistic research and turning to investigation of instances involving the use of multiple languages in acts of multilingual communication" (Arabski & Wojtaszek, 2016, p. 232).

3.3.1 Relations between L2 Acquisition and Processing

Second language processing and acquisition used to be two independent research themes. Sentence processing refers to "the incremental structuring of input across linguistic domains" (Dekydtspotter & Renaud, 2014, p.131). In other words, L2 processing usually involves "the construction of structural representations of

sentences and phrases in real-time language comprehension and production" while the L2 acquisition is "the emergence of linguistic knowledge resulting from analyzing linguistic information in the input" (Mai, 2015, p. 2).

In the last few years, researchers have shown interest in combining these two approaches, because of the limitation associated with interpreting and understanding L2 learners' performance when using a single approach. It is becoming increasingly difficult to discuss one without the other now because second language learners process to acquire and at the same time acquire to process (Carroll, 2001; Fodor, 1998). Real-time processing helps us to understand how the linguistic information is put to use in real-time, as what Roberts and Siyanova-Chanturia (2013) state:

> The major benefit is that it can tap into real-time (or online) comprehension processes during the uninterrupted processing of the input, and thus, the data can be compared to those elicited by other, more metalinguistic tasks to offer a broader picture of language acquisition and processing. (p. 213)

In this research, I will expose acquisition problems and interpret these from the perspective of processing.

3.3.2 L2 Salient Cues

The processing of form-meaning connections in the L2 is also difficult. "Making form-meaning connections is cognitively effortful because working memory limitations restrict attention to multiple cues in the input, learners have to choose which aspects of the input they will process" (Ellis & Sagarra, 2010, p. 86). For instance, the cue for distinguishing between finite and non-finite verbs in English lies in the morphological form as only finite verbs inflect for tense. The cue for distinguishing

this in Chinese is the lexis including aspectual adverbs or morphemes. In the comprehension of L2, the question is the extent to which learners can integrate the L2 cues during automatic processing, and several theories attempt to explain this question, such as the competition model (MacWhinney & Bates, 1989; MacWhinney, 2005). P. Li (1998) offered the following definition:

> The competition model is a cue-based interactive model. It is concerned with how speakers integrate various types of information or cues in a sentence (e.g., word order, subject-verb agreement, and lexical semantics) to determine sentence roles (e.g., who does what to whom). A central tenet of the model is that the same cues vary in their validity across languages, with the validity being determined by how often the cue is available, and how reliably the cue leads to the correct identification of linguistic functions. A typical finding is that the strongest cue in one language can be one of the weakest cues in another. (p. 34)

For instance, tense (e.g., inflectional verbs), temporal adverbs (e.g., today), prepositional phrases (e.g., in the future), verb serialization (e.g., consecutive verbs), calendric references (e.g., Feb 2, 1999) all can express time, but the salience and reliability of these cues differ in different languages (N. Ellis, 2007). "The low salience and low reliability of grammatical cues tend to make them less learnable...and the early experienced cues in the first language affect the learning of later experienced cues and can lead to overshadowing, blocking, and transfer" (N. Ellis, 2007, p. 965). Overshadowing refers to the selection of the more salient cue when two cues are available and jointly function to predict the outcome, in other words, the two cues compete associated with the outcome, and the less salient cue is overshadowed by the more salient one. Another possible outcome resulting from the different salience of

cues is the inattention to a specific cue which is referred as blocking (N. Ellis, 2006). The cross-linguistic influence in processing was noticed as L2 learners with different L1 backgrounds usually give priority to different kinds of cues.

For example, learners from a Chinese, Japanese, or Korean background, which lack articles, were found to have difficulties in using these grammatical elements in L2 English and so, instead, tended to infer referential definiteness via other cues, like lexical information, discourse or context (e.g., Luk & Shirai, 2009). N. Ellis (2006) argues that "when they encounter English articles, lexical and pragmatic cues may overshadow the article and lead L2 users to ignore it, thus blocking the creation of new associations and representations as a result of 'automatically learned inattention'" (p. 178). Likewise, Spanish learners of English would prefer morphological cues in the processing of tense because of the rich morphologies in the L1; Chinese learners of English L2 would choose time adverbs as the first cue due to the lack of morphology in their native language. Therefore, N. Ellis (2007) states that:

> The learning of sentence processing cues in a second language is a gradual process. It begins with L2 cue weight settings that are close to L1, and only gradually over time do these settings change in the direction of the native speaker's settings for L2. (p. 168)

In English MVC structures, inflectional morphology is the salient, reliable cue that is used to distinguish finite from non-finite verbs, as it is explicit, direct, and compulsory. In Chinese MVC structures, lexical and semantic cues are the means of distinguishing finite and non-finite verbs. The lexical markers (aspectual adverbs or morphemes) are implicit and optional. The cue to interpret the interrelations between multiple verbs differs in English and Chinese, and so the morphological cues of [+-F]

distinction in English may be overshadowed by the semantic cues in Chinese, and therefore result in L2 learners' online insensitivity to the salient morphological cue and inability to establish an association between the form of inflections with the function of [+-F] distinction. It may also occur in the opposite direction: the lexical cue is especially difficult for English CSL learners to process because of its relatively low salience (it does not always appear in MVCs), and learners may automatically show inattention to the lexical cues. A vast number of researchers have focused on processing difficulties in L2, and both target-like and non-target-like performance have been found in the previous research.

3.3.3 Previous Studies on Cross-linguistic Influence in L2 Sentence Processing

Previous studies on L2 sentence processing failed to reach a consensus on the role of the L1: some studies found that L2 learners have difficulties in processing morpho-syntactic features that were absent from their L1, while the L1-L2 similar features have a facilitating effect (e.g., Juffs, 2005; Roberts & Liszka, 2013); other studies found no cross-linguistic influences in L2 sentence processing (e.g., Felser, Roberts, Marinis, & Gross, 2003; Marinis, Roberts, Felser, & Clahsen, 2005; Roberts, Gullberg, and Indefrey, 2008; B. Yuan, 2017).

Juffs (2005) used both off-line grammatical judgment tests and on-line word-by-word reading time experiments to investigate second language learners' processing of sentences with *wh*-movement, as shown in example (13):

(13) a. What does Mary believe John teaches ___? (Object extraction)

b. Who does Mary believe ___ teaches linguistics? (Subject extraction) (Juffs, 2005, p. 123)

The second language learners had, respectively, a background in Chinese (N=30) and Japanese (N=30), which are *wh*-in-situ languages; and Spanish (N=46), which has the *wh*-movement, as in English. It was found that the on-line processing of the *wh*-movement in the L2 largely depends on whether there is overt *wh*-movement in the L1: the L2 learners from a background without it had difficulties in processing L2 wh-movement, and the word order in the L1, such as the SOV word order (subject + object + predicate) in Japanese, has a particularly negative influence on *wh*-movement processing. Likewise, the facilitating role of L1-L2 similar morpho-syntactic features in L2 sentence processing was observed in Roberts and Liszka (2013)'s research. The researchers investigated whether advanced French and German learners of English were sensitive to tense/aspect violations between fronted temporal adverbial and inflected verbs in real-time comprehension, as shown in example (14)

(14) a. Last week, James went/*has gone swimming every day.

b. Since the summer, James has gone/*went swimming every day. (Roberts & Liszka, 2013, p. 419)

They found that, even though both groups performed similarly in cloze and grammaticality judgment tasks, only the French L2 learners were sensitive to the mismatch in both past simple and present perfect sentences, while the German L2 learners did not show the sensitivity towards these. It suggested that the group differences in the performance are related to the different L1 background, "namely, only those whose L1 has grammaticized aspect (French) were sensitive to the tense/aspect violations online, and thus could be argued to have the implicit knowledge

of English tense/aspect distinctions" (Roberts & Liszka, 2013, p. 413).

Different results were produced by Roberts et al. (2008)'s study on the processing of subject pronouns in the L2. Languages like Dutch and German are non-null subject languages, which indicates that the overt subject pronoun is obligatory while, in comparison, null subject languages like Turkish allow the absence of subject pronouns, as these are optional, and "the relative distribution of null subjects to overt subjects is governed by discourse-pragmatic constraints" (Roberts et al., 2008, p. 335). It was thus predicted that, if there was L1 influence from a null subject language, the L2 learners would find the discourse context easier when processing sentences, as in example (15) a, while learners from a non-null subject language background would find sentence internal processing in subject pronoun resolution easier, as in example (15) b. Finally, in sentences with a subject pronoun optional resolution (example (15) c), the preference for explaining the subject pronoun can directly expose the aspect of cross-linguistic influence.

(15) Resolution Types:

  a. Local Resolution: De werknemers zitten in het kantoor. Terwijl Peter aan het werk is, eet hij een boterham. Het is een rustige dag.

  The workers are in the office. While Peter is working, he is eating a sandwich. It is a quiet day.

  b. Disjoint Resolution: De werknemers zitten in het kantoor. Terwijl Peter aan het werk is, eten zij een boterham. Het is een rustige dag.

  The workers are in the office. While Peter is working, they are eating a sandwich. It is a quiet day.

  c. Optional Resolution: Peter en Hans zitten in het kantoor. Terwijl Peter aan het

werk is, eet hij een boterham. Het is een rustige dag.

Peter and Hans are in the office. While Peter is working, he is eating a sand-wich. It is a quiet day. (Roberts et al, 2008, p. 341)

The results of the off-line grammaticality judgment test show that three groups have no differences and all found disjoint resolution sentences less acceptable than the other two conditions, however, regarding the test requiring the participants to explain the subject pronoun under optional resolution conditions, the Turkish learners displayed a preference for sentence-external resolution. Thus, L1 influence is evident. The on-line eye-tracking experiments revealed that both learner groups were at a processing disadvantage with regard to the optional resolution condition in comparison with the native speakers of Dutch, and no evidence showed an L1 influence on the on-line processing of subject pronouns. A similar conclusion—that the differences between the native speakers and L2 learners' online performance may be attributed to the different processing procedures between the L1 and L2 rather than the different language backgrounds—were also drawn in the studies conducted by Felser et al. (2003), and Marinis et al. (2005). Thus, several authors assume that L2 learners are less able to use the syntactic cues in L2 sentence processing, and tend to rely instead on lexical, semantic, or contextual information. This is known as the Shallow Structure Hypothesis (Clahsen & Felser, 2006). However, this hypothesis has been challenged by other studies (e.g., B. Yuan, 2017). In B. Yuan's research on the L2 processing of Chinese base-generated-topic sentences (example (16a)), the English learners showed a similar processing pattern to the native speakers of Chinese during the self-paced reading experiments, and also in conditions containing semantic

violations. As shown in the example (16b) and (16c), both the learners and natives' groups showed sensitivity. Thus, it was concluded that English learners of Chinese can use both syntactic and semantic cues when processing base-generated-topic sentences.

(16) a. Shuiguo wo zui ai chi xiangjiao

Fruit I most love eat banana

As for fruit, I like to eat bananas the most.

b. *xiangjiao wo zui ai chi shuiguo.

*Banana I most love eat fruit

*As for bananas, I like to eat fruits the most.

c. *pingguo wo zui ai chi xiangjiao

*Apple I most love eat banana

*As for apples, I like to eat bananas the most. (B. Yuan, 2017, p. 49)

In general, L2 syntactic processing showed mixed results, and the role of the L1 remains unclear. Roberts et al. (2008) argued that CLI was not evident in particularly complex sentences in L2 processing, such as the long-distance dependencies, which entail high processing demands. Moreover, the researches which showed L2 learners' native-like processing patterns usually investigated structures that, to some extent, are reminiscent of those in their L1. Thus, this calls for online research that involves both reminiscent structures with the L1 and structures that have more subtle or abstract differences with the L1. The studies on the L2 processing of MVCs can meet this

requirement, because both types, i.e. those with verbs as subject or object which share similarities in terms of their finite and non-finite distinctions and those like pivotal or serial-event sentences in Chinese vs. non-finite verbs as the object complement or adverbial, which have more abstract differences between the finite and non-finite distinctions. The results of the on-line processing of MVCs will enrich the literature on L2 sentence processing and provide implications for the theories on cross-linguistic influences.

Another phenomenon that was observed in the previous L2 sentence processing studies is that the cross-linguistic influences on online processing and the off-line grammaticality judgment test may show asymmetry. For example, in Roberts and Liszka (2013)'s study, the results from the off-line grammaticality judgments showed no cross-linguistic differences: both the French and German learners' of English judged the mismatch between a temporal adverbial and the aspect to be less acceptable; however, in the on-line, self-paced reading task, only French learners of English whose L1 has the grammaticalized aspect showed sensitivity to tense/aspect violation, while German learners of English, whose L1 lacks the grammaticalized aspect, did not display any processing difficulties related to the temporal adverbial and aspect mismatch. The authors argued that the off-line task requires explicit knowledge while the online task implicit knowledge, while the cross-linguistic differences may have different influences on these two types of knowledge. According to Masters (1992), "explicit knowledge is facts and rules which we are aware and able to articulate, and in the cognitive phase when knowledge is explicit and rule-based, and performance is slow, erratic and requires much effort" (p. 343). In contrast, implicit knowledge is knowledge of which we are unaware, and it is automatic. In the automatic phase, knowledge is non-verbalized, and performance is smooth, effortless and fast, while

online tasks, such as real-time spontaneous oral production tasks and event-related potential (ERP) responses in sentence comprehension tasks, correspond to implicit knowledge (R. Ellis, 2005).

There is no consensus about the relationship between explicit knowledge and implicit knowledge. The strong interface account argued that explicit knowledge can be converted to implicit knowledge and vice versa (e.g., DeKeyser, 1998); while the non-interface account believed that explicit and implicit knowledge are in two different processing systems with different mechanisms (e.g., Hulstijn, 2002); and the weak interface account claimed that only in certain conditions, the explicit knowledge can change to implicit (R. Ellis, 1993).

To expose the cross-linguistic influences fully, a comparison between implicit and explicit knowledge is needed. From the perspective of the competition model, MacWhinney (2005) stated that:

> [O]ne of the core findings of Competition Model research has been that, when adult subjects are given plenty of time to make a decision, their choices are direct reflections of the cumulative validity of all the relevant cues. In this sense, we can say that offline decisions are optimal reflections of the structure of the language. However, when subjects are asked to make decisions online, then their ability to sample all relevant cues is restricted. (p. 53)

The online tasks restrict the L2 learners from sampling all relevant cues and more easily lead to L1 transfer in cue selection, while the offline tasks allow the L2 learners to sample all of the relevant cues and make a judgment; thus they may be less likely to be influenced by their L1. The present study will, therefore, involve both on-line and off-line tests to investigate the possible cross-linguistic influences on explicit and

implicit knowledge by MVCs in the L2.

To sum up, this section has demonstrated the importance of combining acquisition and processing approaches in interpreting and understanding L2 learners' performance, introduced the competition models for explaining the form-meaning mappings cognitively in the L2, reviewed the previous studies on cross-linguistic influences on L2 sentence processing and finally, based on the above-stated literature, illustrated the significance of exploring the L2 processing of MVCs. The current research embodies a bidirectional study on both English CSL learners and Chinese ESL learners' acquisition and processing of the MVCs in the target language, and the reasons for conducting a bidirectional study are given in the next section.

3.4 CLI from the Bidirectional Perspective

The cross-linguistic influence researches not only involve different linguistic properties, such as phonology, lexicons, morphology, syntax, semantics, and pragmatics, but also take varied research directions, including one direction or bi-direction. Odlin (2005) notes that an effective way to examine cross-linguistic influence is to study bidirectional transfer. For instance, Rocca (2003) examined the effects of L1 Italian on L2 English and vice versa. In a longitudinal study, the distribution of verb morphology of three Italian children learning English as their L2 (age: 7-9) and three English children learning Italian as their L2 (age: 7-9) were observed in order to investigate the role of L1 in the acquisition of tense and aspect. The results showed that, in both directions, the L2 learners' initial distribution of the verb morphology is consistent with the aspect hypothesis, which predicts that the progressive will be used with activity and state verbs, while "the overextension/

underextension patterns related to L1 influence emerge only later" (p. 280). This research from the bidirectional perspective distinguished the L2 developmental problem from the L1 transfer, and provided sound proof of the restriction of the L2 learning stages on L1 transfer.

In a more recent study, Ionin, Montrul, & Caece (2013) examined the interpretation of bare plurals by L1-Spanish-L2-English and L1-English L2-Spanish learners, using a truth-value judgment task (TVJT). English and Spanish differ with regard to the usage of definite plurals: Spanish allows definite plurals to express both generic and specific meanings, whereas definite plurals in English can only express a specific, non-generic meaning. In the study, the researchers examined if the forms can be mapped with accurate meaning in the L2. The results showed that, in both directions, the lower-proficiency learners experienced semantic transfer whereas, with the development of L2 proficiency, more target-like performance was found. Furthermore, "learners were found to be more successful in learning about the (un)grammaticality of bare plurals in the target language than in assigning the target interpretation to definite versus bare plurals. This finding is shown to be consistent with other studies' findings of plural noun phrase interpretation in monolingual and bilingual children" (Ionin et al., 2013, p. 483). Thus, this study revealed the developmental problems as well as the cross-linguistic influences using a bi-directional comparison.

These examples showed that bidirectional studies can provide convincing evidence of the role of cross-linguistic differences in second language acquisition and can distinguish these from general developmental problems. Learning a second language is not a simple one-to-many or many-to-one form-meaning mapping, but a reconstruction of concepts and language habits. Learning less is not necessarily easy,

and learning more grammatical rules is not necessarily difficult. Moving from an inflectional to a non-inflectional language is not necessarily simple, while moving from a non-inflectional to an inflectional language is not necessarily complex. The bi-directional study can provide a comprehensive view on whether the contrast between the two languages poses difficulties for L2 learners, identify whether the cross-linguistic influence caused by the two language contrasts is bi-directional or asymmetrical, distinguish the cross-linguistic influences from developmental problems, and thus make a sound contribution to the theories of second language learning. Based on the premise of the advantages of bi-directional studies in the research on the cross-linguistic influences on L2 acquisition, the current research will also adopt the bi-directional approach to investigate whether Chinese learners of L2 English and English learners of L2 Chinese have difficulties in producing MVCs and also whether they have explicit and implicit knowledge of the MVCs in the target language.

3.5 Chapter Summary

This chapter has reviewed the literature on interlanguage researches on MVCs in L2 English and L2 Chinese learning, together with cross-linguistic influences on the L2 acquisition, on L2 processing, and in bi-directional studies.

The previous studies showed that, in producing English MVCs, morphology appears to be problematic, especially among low proficiency learners, who have been observed to both over-inflect and underuse non-finite verbs (Fang, 2009; Yang & Huang, 2009). However, Chinese ESL learners are argued to have syntactic knowledge of finite and non-finite distinctions (Chang, 2005), and also better comprehension of

the forms of non-finite verbs compared to their production of these (W. Shi, 2010; S. Liu, 2012; L. Yang, 2012). No evidence of a systematic lack of finite and non-finite distinctions was found in the International Corpus of English-Hongkong (Gisborne, 2009). In the opposite direction, L2 learners' acquisition of pivotal and serial-event sentences was investigated, and the misuses found tended to be omission, redundancy, word order or collocation (Zhou, 2009; Sun, 2008). The learners underused these sentences, and their frequency of usage seems to be in accordance with their L2 proficiency. The limitations caused by a lack of detailed interpretation of non-target-like misuses call for further exploration.

The differences in the finiteness of English and Chinese MVCs pose form-meaning mapping difficulties for L2 learners, considering the form meaning in sentences with similar semantic finiteness, the meaning mapping of the cues, and the form-meaning mapping in the different sentence structures as pivotal sentences vs. the non-finite verbs as object complement sentences, and serial-event sentences vs. non-finite verbs as adverbial sentences. Thus, it is possible that L1 transfer may occur. Through transfer analysis, numerous previous studies have identified morpho-syntactic transfer from Chinese structures to English in L2 learners' interlanguage. However, there were also studies showing that the Chinese and English contrasts do not necessarily lead to cross-linguistic influence, as this may depend on the specific property. The current study will employ transfer analysis to expose the possible cross-linguistic influences on L2 learner's interlanguage.

More recently, many SLA researchers have combined the traditional L2 acquisition and processing approaches. L2 acquisition refers to the emergence of linguistic knowledge while processing denotes the construction of structural

representations of sentences in real-time. The form-meaning mapping may also be cognitively draining because of the need to make a selection from the multiple cues. The salience, the reliance of the cues in the L2 and the earlier experience of the cue in the L1 are influential factors in L2 processing. Previous studies failed to produce consistent results regarding the question of whether the L1 and L2 contrasts may influence the L2 processing. To gain a comprehensive view of how cross-linguistic differences influence L2 study, the current study will also explore whether the differences between the finite and non-finite distinctions in English and Chinese, respectively, would have some influence on L2 processing.

Finally, this chapter introduced the previous bi-directional studies in the field of cross-linguistic influences. It was found that the bi-directional approach is useful in distinguishing the cross-linguistic influence of developmental problems, and also has the advantage of revealing whether the cross-linguistic influence caused by the language contrasts is bi-directional or asymmetrical in nature. Thus, the current research will adopt a bi-directional approach.

4. Chapter Four Research Questions and Methodology

Finiteness in Chinese is semantically-orientated and implicit. It relies on the combination of verbs with aspectual markers to distinguish finiteness, and the lexical restrictions are optional. In English, finiteness is morphologically-orientated and explicit. It relies on inflectional morphology to distinguish finite from non-finite forms and morphological restrictions are obligatory. The finite and non-finite distinctions in the L1 may influence the acquisition and comprehension of MVCs in the L2, and the L2 learning involves mapping between forms and meanings, switching from the lexical to the morphological cues or vice versa.

In this chapter, I will present the research gaps underlying the current study, which have been established on the basis of previous studies, and also present the research questions, state the significance of the current study, and provide a description of the experimental design and methodology.

4.1 Research Gap, Questions and Significance

4.1.1 Research Gap

Research gaps exist between the theories of typological differences on finiteness and its influence on second language studies; between the previous literature on MVCs' error analysis and transfer analysis, with a detailed comparison of the L1 and the L2 in the research scope; between the investigation of learners' interlanguage and processing in the research methodologies; and, finally, between the one-direction studies and bi-directional studies in terms of research direction.

As described in earlier chapters, Chinese and English MVCs differ, since they are

composed of finite verbs with non-finite verbs in English but made up of bare verbs or verbs with aspectual markers in Chinese. Even though much effort has been made to discuss finiteness in Chinese, no specific comparison had been made between Chinese and English MVCs on the basis of the finite/non-finite distinction. The current research fills this gap by providing a detailed comparison of Chinese and English MVCs based on the semantic finiteness theories (Klein, 1998, 2006, 2009). The comparison is thus classified into two types: in sentences with verbal subject or object, Chinese and English MVCs have a similar division of finiteness but different cues for distinguishing finite verbs from non-finite ones. In another type of sentence, Chinese pivotal sentences are interpreted differently, with an aspectual morpheme after V_2. because V_2 is encoded with temporal information and composes a compounded predicate together with V_1. Moreover, Chinese serial-event sentences with bare verbs have more than one interpretation, so these structures have both meaning and form contrasts with English non-finite verbs, as the object complement or adverbial. In other words, English MVCs have explicit morphological finiteness, and do not display any differences from the syntactic positions of non-finite verbs. Chinese MVCs have semantic finiteness and show different features in the finiteness division in different sentence types, which include both sentences with a clear finite and non-finite distinction and sentences with compound predicates, which is unique to Chinese. Given the cross-linguistic differences between these two languages, learnability problems arise.

The debate on the finiteness of Chinese has been ongoing for decades, but the research has remained at the theoretical level. As regards the influence of finiteness on second language learning, little research has been carried out so far. Given the huge cross-linguistic differences between English and Chinese MVCs, learnability

problems may be evident, but the previous studies discussed above have been insufficient to expose the influence of the differences in the expression of finiteness on the acquisition and processing of MVCs in the L2. The current study thus fills the gap between the theories of the typological differences of finiteness in different languages and its influence on L2 learning.

The few studies on the acquisition of English MVCs by Chinese learners and Chinese MVCs by English learners were limited in research scope, and focused solely on error analyses and frequency-of-use comparisons. Further investigation into the effects of the L1 on processing as well as the acquisition is required. The current study aims to fill this gap in the research scope.

Additionally, the methodologies in the current research are more diversified and involve different approaches in L2 researches which can fill the gap caused by the rarity of L2 studies on online measures in Chinese. As Mai (2015) commented, the Chinese L2 studies in recent years "typically tap into the property of L2 grammars using behavioral methods such as grammaticality judgments, translation, and structured oral production tasks. Research using time-course sensitive online measures such as eye-tracking and self-paced reading is still rare" (p. 15). Besides real-time processing methods, quite few studies have focused on the acquisition of these Chinese special structures, like pivotal sentences, serial verb constructions or verbs/ verbal phrases as subject and object. As Zhao (2011) summarizes, in comparison with the English as L2 studies, the research on L2 Chinese learning is a relatively new area.

The current thesis comprises a bidirectional study, which can give us a clear, direct insight into the comparison between processing lexical cues and morphological cues. This is an important way to investigate cross-linguistic influence since, as Odlin

(2005) states, "[a]nother dimension of transfer research is the study of bidirectional transfer" (p. 5).

In sum, the research gaps tend to lie in four areas: from finiteness theory to its influence on L2 MVCs learning; from L2 MVCs acquisition to comprehension; from non-time limitation methods to real-time methods; and from a single direction to bi-directional study. In Figure 1 "research framework", a grey rectangle means that there have been previous studies on this topic, but the research perspective differs from that of the current research, while a white rectangle indicates that no previous research has been carried out on this aspect.
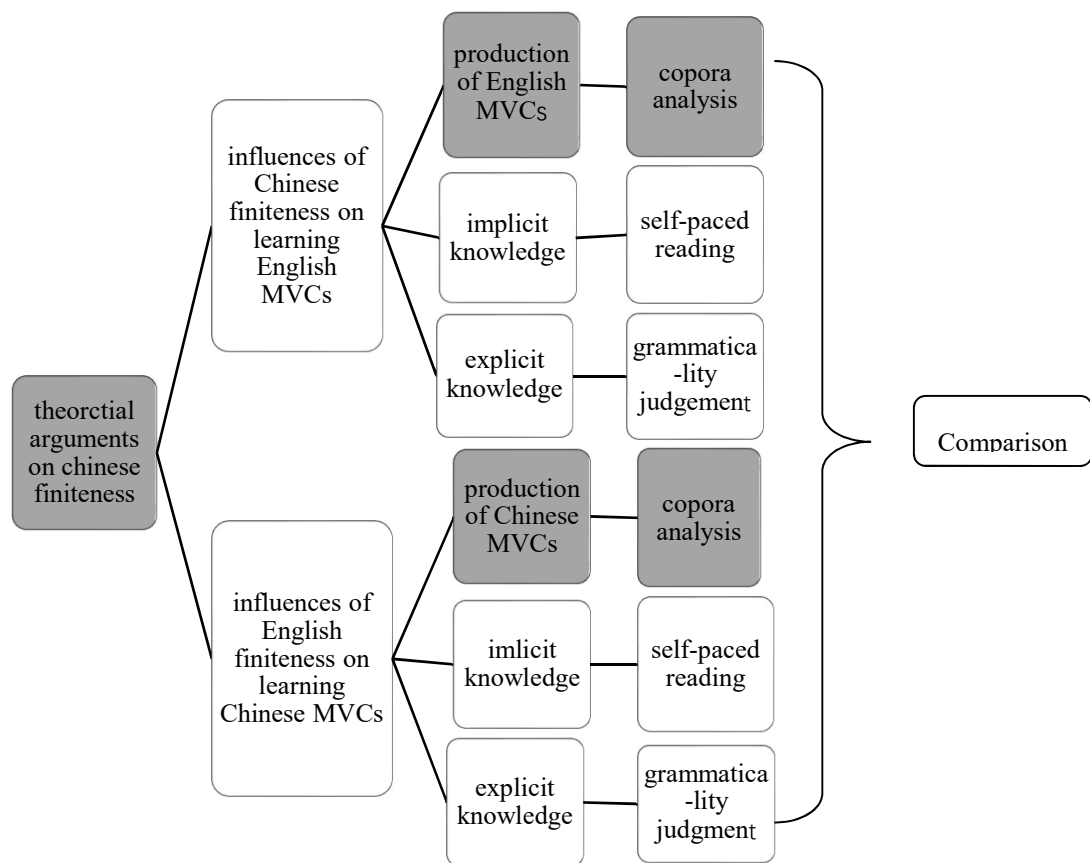
Figure 1. Research framework

4.1.2 Research Questions

This research attempts to answer one question: whether and how cross-linguistic differences between typologically distant languages, i.e., morphological-finiteness vs. semantic-finiteness, influence L2 grammatical acquisition and processing. This question is further divided into six sub-questions, which are respectively addressed from the direction of English as L2 learning and Chinese as L2 learning.

With regard to English as L2 learning, I will conduct a thorough, comprehensive study of the cross-linguistic influence on Chinese ESL learners' production, explicit and implicit knowledge of English MVCs and of the role of L2 proficiency.

Question 1: What are the problems related to Chinese ESL learners of different levels of L2 proficiency's production of English MVCs?

Question 2: Do Chinese ESL learners of different levels of L2 proficiency possess explicit knowledge of the [+-F] distinctions in English MVCs?

Question 3: Do Chinese ESL learners of different levels of L2 proficiency possess an automatic sensitivity to the salient morphological cues in [+-F] in processing English MVCs?

As for Chinese as L2 learning, the following questions are addressed:

Question 4: What problems do Chinese CSL learners of different levels of L2 proficiency encounter when producing Chinese MVCs?

Question 5: Do English CSL learners of different levels of L2 proficiency possess explicit knowledge of the lexical cues in Chinese MVCs?

Question 6: Do English CSL learners of different levels of L2 proficiency apply implicit knowledge of the lexical cues when processing Chinese MVCs?

In sum, with regard to Chinese-learning, the influence of English finiteness on L2 learners' production and implicit and explicit knowledge will also be thoroughly investigated. The bidirectional study will finally present a qualitative comparison.

4.1.3 Research Significance

The current research investigates how the typological differences in finiteness influence L2 study. The property of finiteness is very important in morpho-syntactic construction. Nikolaeva (2007) stressed that finiteness is a central element in theorizing about morpho-syntax, as it is related to tense marking, subject-verb agreement and the requirement that clauses have a subject. Gisborne (2009) argued that some of the typological contrast at the morpho-syntax level, such as the topic prominent and null subject in Chinese vs. the subject prominent and non-null subject in English contrast, and tenselessness in Chinese vs. tense in English contrast, may be due to the fact that Chinese lacks a super-category or a more abstract category of finiteness: in a language where there is no finiteness, there is no need to have a copular verb, tense or even a subject to carry morpho-syntactic information to express the finite and non-finite distinctions. Thus, the finiteness might be a super-abstract property that relates to other apparent typological differences between English and Chinese. It is therefore important to investigate how the typological differences of this super-abstract property influence L2 acquisition, which may reveal a deeper picture of L2 learners' sentence construction since, as Klein (2006) notes, "the acquisition of finiteness leads to a major restructuring of learner language" (p. 5).

Cross-linguistic influence has received considerable attention, as "cross-linguistic influence is an important topic not only for SLA research but also for studies of language contact, which usually emphasizes the socio-historic product of an

acquisition process" (Odlin, 2005, p. 4). This study chooses similar sentence patterns between English and Chinese MVCs, focuses on the similarities and differences related to the [+-F] distinctions, and probes the influence from linguistic distant L1 on the L2. This will contribute to the theories on Chinese linguistics in general as well as those on second language acquisition.

In addition to the significance of the investigated property and the contribution to the theories of second language acquisition, the research methodology is also original and of significance. Even though a few previous researches have employed time-course sensitive methods to explore Chinese L2 learners' online sentence processing, such as Y. Cui (2013), Wen and Schwartz (2014), and B. Yuan (2017), a word-by-word self-paced reading paradigm was applied. In comparison with the word-by-word paradigm, the phrase-by-phrase self-paced reading paradigm is more natural and closer to normal reading, and so may eliminate the disadvantage caused by the SPR task itself, such as the high tendency towards incremental processing (Jegerski, 2014). The present research uses a phrase-by-phrase self-paced reading task to reveal L2 learners' online sensitivity to the lexical cues in the [+-F] division in Chinese MVCs, which takes account of the incremental processing factors and can better expose the possible discrepancies that may arise because of the respective processing habits of native speakers and L2 learners. This will contribute to the research methodologies employed to investigate Chinese L2 learners' online sentence processing.

As a bidirectional study, moreover, it can provide us with a clear, direct insight into the comparison between the processing of lexical and morphological cues. As far as we are aware, this is the first study to explore Chinese-English bilinguals' online

processing of multi-verb constructions in the target language.

In general, the gap between the theoretical debate on Chinese finiteness and its influence on L2 learning, the limits in error analysis in the field of finiteness acquisition and the rare use of the time-course method for researching Chinese L2 learning make this research's contribution significant to the fields of cross-linguistic influence on second language acquisition and L2 processing.

In sum, this section summarized the research gaps, questions, and significance. The research methodologies will be illustrated in the next section.

4.2 Research Methodology

The form-meaning mapping may result in learnability problems in the acquisition of grammar in the L2, and any differences in the salient cues may lead to overshadowing, blocking, and/or transfer. Previous studies on cross-linguistic influence have tended to focus on the discrepancies between the L1 and L2. With a shift towards comprehension and the involvement of methodologies from the psycholinguistic and neurolinguistics approaches, traditional methods in SLA, such as translation, grammaticality judgment, and composing sentences with pictures, are being complemented by response-time recording techniques like self-paced reading. These methods can help to tap into different kinds of knowledge concerning the cross-linguistic influence on both performance and competence. Specifically, the former tasks can be argued to tap into explicit meta-linguistic competence whereas time-sensitive methods may provide us with a picture of (more implicit) processing competence.

To answer these questions, different kinds of research methods were used. In

investigating production problems in MVCs in English as L2 and Chinese as L2, large-scale learners' corpora were used. To explore further the metalinguistic knowledge of finiteness in MVCs, the offline grammatical acceptability test was applied. To research the sensitivity to salient cues in L2 parsing, self-paced reading experiments were employed (see Table 8). The following sections will provide a detailed description on why and how these testing methods were applied.

Table 8 *Research Aims and Methods*

Research Aims	Research Methods
Investigating L2 learners' misuse in their interlanguage	Corpora analysis
Investigating L2 learners' explicit knowledge of the salient cues of the [+-F] distinction in MVCs	Grammaticality judgment task
Investigating L2 learners' implicit knowledge of the salient cues of the [+-F] distinction in MVCs	Self-paced-reading task

4.2.1 Corpus Analysis

A learner corpus is a collection of learners' written compositions or the transcribed texts of spoken language. "Learner corpora have quickly become one of the most important resources for studying interlanguage" (McEnery & Wilson, 2001, p. 32).

4.2.1.1 Advantages of Corpus Analysis

In comparison with other methods in second language acquisition studies, learner corpora have the advantages of being natural, large-sample and homogeneous, which is especially suitable for exposing which aspects of language are more vulnerable to

transfer or cross-linguistic influence, and which patterns of learners' use can be generalized.

As Lozano and Mendikoetxea (2013) mentioned, researchers are becoming increasingly aware of the benefits of analyzing extensive naturalistic data to understand L2 grammar acquisition and development, because the data produced using the experimental and introspective methods, like the grammaticality judgment tests, tend to be narrow, with a limited number of subjects, and raise the question about whether the results can be generalized. Myles (2005) notes that case studies and other small-scale experimental studies in second language acquisition have focused on hypothesis-building, but it is now time to test this hypothesis using a larger, better-constructed database.

4.2.1.2 Corpus Data Analysis Methods

There are two main approaches to corpus data analysis which are, respectively, inductive and deductive. In the top-down deductive approach, learners' corpora are used to test a hypothesis which has been formulated and proposed via theories or small-scale case studies and thus provide a tool for hypothesis-driven/corpus-based studies. In the bottom-up inductive approach, learners' corpora are used to formulate a hypothesis, involving the discovery of patterns of data in a more exploratory way, and provide a tool for use in hypothesis-finding/corpus-driven studies (Lozano & Mendikoetxea, 2013). "The majority of studies within the area of learner corpus research fall within the hypothesis-finding category. Hypothesis-driven, corpus-based studies are hard to find" (Lozano & Mendikoetxea, 2013, p. 69).

To investigate the influence of Chinese finiteness on the production of English MVCs, I used the bottom-up inductive approach to explore the Chinese Learners'

English Corpus (CLEC) (Gui & Yang, 2003), which is one of the largest interlanguage corpora of Chinese ESL learners. The description of CLEC and the analysis of learners' misuses will be introduced in Chapter Five. The influence of English finiteness on the production of Chinese MVCs were explored using the Hanyu Shuiping Kaoshi (HSK) dynamic composition corpus (X. Cui, 2006), which is the largest Chinese as L2 studies interlanguage corpus. This will be introduced in Chapter Six.

4.2.1.3 Limitations of Corpus Analysis

The use of learner corpora also has its limitations in second language acquisition studies, as these corpora are more concerned with description than interpretation and so need to be combined with other data. Bley-Vroman (1986) noted the problem of ambiguity in production data and argued that the inadequacy of production data makes it hard to determine the hypothesis type. Yip (1995) pointed out that, in production data, certain properties were hard to produce, except when they were specifically elicited, which may be attributed to L2 learners' avoidance strategy in second language learning. "Moreover, a learners' knowledge of ungrammaticality of a structure cannot be ascertained from production data in principle" (Yip, 1995, p. 9). All in all, the contribution of learners' interlanguage corpus research is mainly on the description rather than the explanation of SLA data, and on documenting the differences between native and non-native speakers rather than addressing certain theoretical issues (Lozano & Mendikoetxea, 2013).

Thus, these deficiencies make the interlanguage study insufficient and call for varied research methods to complete the interlanguage analysis. "Some researchers are currently claiming that combining both naturalistic and experimental data is crucial to gain insight into the relation between the two types of data" (Lozano &

Mendikoetxea, 2013, p. 67). To compensate for the insufficiency of corpus analysis and interpret the interlanguage data, the current research combines the analysis of learners' corpora and the grammaticality judgment task, which will be introduced in the next section.

4.2.2 Grammaticality Judgment Test

Grammaticality judgment tests (GJT) are sometimes interchangeable with acceptability judgment tests and both are referred to as "a task in which participants are presented with one sentence at a time and asked to judge its grammaticality" (Ionin & Zyzik, 2014, p. 38). The test usually has a property of utterances and the property strongly influences the participants' judgment of that utterance. Most of the grammaticality judgment tests focus on how the participants judge the interlanguage grammar.

4.2.2.1 Advantages of Grammaticality Judgment Test

Mackey and Gass (2005) claimed that grammaticality judgment tests can examine grammatical properties intensively and thus provide sufficient evidence; can reveal whether learners possess the knowledge of the grammatical property (with the mental representation), and thus test certain theoretical hypotheses. Moreover, it is easier to "control the variables that affect learner production in a non-experimental context" (Granger, 2002, p. 6). Therefore, to answer certain SLA questions, researchers need to know how learners rule out sentences and judge the potential L2 sentences. This may directly reveal learners' explicit knowledge of the investigated sentences (R. Ellis, 2005), which is useful for testing hypotheses, providing interpretations of the production data, and making comparisons with the data elicited by other tasks, such as the automatic online processing data.

4.2.2.2 Design and Data Analysis of the Grammaticality Judgment Test

There are several kinds of GJT, including those that require error correction or non-correction; those with and without time limits; and those that use a binary scale or a Likert scale. The choice of the various GJT forms depends on the research questions. The correction of interlanguage, on the one hand, can ensure that the learners reject the sentence for an appropriate reason but, on the other hand, may lead to the over-acceptance of sentences because participants avoid the extra work of correction or disguise the uncertainty of the sentences (Falk & Bardel, 2011). Binary scale judgment is more suitable for children's acquisition research, as it is direct and easy to handle, while Likert scales or graded judgments are better suited to reflecting more sophisticated, adult perceptions. For instance, Theakston (2004) used a seven-point, graded Likert-type scale to test overgeneralization errors in verb-argument structure; Bruhn de Garavito (2011) used a five-point Likert scale to examine several different properties of subjects and objects in L2 Spanish; and B.Yuan and Dugarova (2012) used a Likert scale from -3 (completely unacceptable) to +3 (completely acceptable) to investigate wh-topicalization in L2 Chinese. The lack of time limits makes it easier to reflect explicit grammatical knowledge. In the current research, the grammaticality judgment test is employed to test explicit knowledge, and no time limit is set for the task.

The usual GJT data, with a Likert-scale of several points, is ordinal data, and parametric statistical tests, such as t-tests and ANOVAs, are commonly used for the analysis. In this research, I designed an untimed, 6-point Likert-scale grammatical judgment test with no correction requirement because of three reasons. That is, the research purpose is to understand L2 learners' explicit knowledge of salient cues of

[+-F] in MVCs in L2; the research subjects are adults with relatively sophisticated judgment ability; and we attempt to avoid the participants' over-acceptance of ungrammatical sentences. The GJT design and results with English as L2 learners will be introduced in Chapter Five and with Chinese as L2 learners in Chapter Six. With this paradigm, the grammatical knowledge can be demonstrated in the form of unambiguous, numerical data, which would not require any ranking or sorting. This can compensate for the limited interlanguage analysis associated with direct statistical analysis.

4.2.2.3 Limitations of the Grammaticality Judgment Test

As mentioned in 4.2.1, GJT data is limited by the small number of subjects, which thus raises the question about whether the formulated hypothesis, based on these small-scale data, can be generalized. To facilitate both a description and an interpretation of the question regarding whether and how cross-linguistic differences in the [+-F] distinction in the L1 influence L2 learners' acquisition of MVCs in the target language, the current research employed both methods and will make a comparison between them.

In the current study, production in the L2 demands higher accuracy in and greater familiarity with grammatical knowledge, and the misuses in production may be attributed to L1 influence and other L2 developing problems, such as unfamiliarity with the L2 grammar, overgeneralization, or other reasons. GJT does not require a high degree of accuracy, so results of these two tasks may appear asymmetric since, even having attained a grasp of grammatical knowledge, one may still make production mistakes.

4.2.3 Self-paced-reading

"Self-paced-reading (SPR) is a computerized method of recording a reading time for each designated segment (i.e., a word or a phrase) of a sentence or series of sentences that is presented as an experimental stimulus" (Jegerski & VanPatten, 2014, p. 24). Just et al. (1982) proposed the eye-mind assumption, which states that the amount of time taken to read a word reflects the amount of time needed to process it. There are several formats for displaying segments in SPR experiments. In linear self-paced reading experiments, a button press would cause the first segment of a sentence to appear, together with a series of dashes representing the number of remaining segments, while in centered display, every segment appears in the center of the screen and overwrites the previous one. When a participant finishes reading the segment and is ready to continue, the next button press will reveal the next segment, and so forth until the end of the sentence. And the display can be cumulative, meaning a segment keeps visible once it is revealed, or non-cumulative, referring that the press of button would cause the disappearance of the last segment and appearance of a new segment. Most SPR studies now "elect for a noncumulative linear display, which is also referred to as the moving window(s) technique because successive button presses cause the unmasked segment of text to proceed like a moving window across the computer screen" (Jegerski & VanPatten, 2014, p. 26). Stimuli in self-paced reading studies tend to contain violations of the investigated property or linguistic phenomenon, which leads to a longer reading time at the point or segments after that, because the reader would have difficulty in integrating a word that does not fit into the other segments of the sentence, which leads to processing difficulties. Comprehensive questions usually follow the stimuli and the accuracy of the answers reflects whether or not the

participants have read for meaning. There are several reasons why we chose to employ the moving-window, self-paced reading method and they will be introduced in 4.2.3.1.

4.2.3.1 Advantages of Self-paced Reading Tasks

SPR is convenient and can be carried out on a laptop anywhere, given the requisite software. The current research needs a large number of participants from both China and the UK, which requires a convenient experimental instrument. In comparison with other psycholinguistic methods, such as eye-tracking which has to be done in the lab, a moving-window self-paced reading experiment is more flexible.

SPR is suitable for syntactic anomaly processing and sensitivity tests. The purpose of this study is to test whether Chinese ESL learners are sensitive to the anomalous morphology of non-finite verbs in English. Most processing studies with the use of SPR are anomalies, such as "specific violations of grammar (i.e., error recognition or grammaticality paradigms) as well as inconsistent or non-canonical permutations of word order, semantics, discourse, and other syntactic and extra-syntactic factors" (Jegerski, 2014, p. 6). For instance, in the current research, an ungrammatical sentence like "**the boss encouraged me attended the meeting*" can be used in the SPR experiment to test if learners are sensitive to the morphological cue in distinguishing finite and non-finite verbs.

SPR is a covert measure of sentence processing. The attention of participants can be diverted by the questions or other comprehension tasks. Experimental items are set amongst a number of "filler" sentences (of different types) in order to attempt to divert the participants' attention from the experimental manipulation(s).

There are several other advantages associated with using SPR as a testing method; for instance, it is efficient, since the reading task is conducted at the participants' own

reading speed and does not require any interference by the researcher. It is also accessible to use with commercial software such as E-prime to design the program, and it can show any spill-over and wrap-up effects. Spill-over effects mean that the increased reading time may appear immediately after the critical segment or even at the end of a sentence, which can be regarded as a signal of processing difficulty (e.g., Roberts & Liszka, 2013). Wrap-up effects occur when readers process words more slowly when they appear at the beginning or end of the sentence, rather than in the middle, which indicates the integration of information (e.g., Felser et al., 2003).

4.2.3.2 Experiment Design and Data Analysis

There are several types of SPR which includes linear cumulative or non-cumulative presentation, and word-by-word or phrase-by-phrase presentation on the screen. Accordingly, two ways are possible to analyze the data: analyzing the raw response times (RTs) or the residual RTs.

As mentioned at the beginning of this section, most researchers prefer the linear non-cumulative SPR because it disallows the participants to look back and provides more accurate data of the RTs. And the advantage of the phrase-by-phrase presentation is that it is more similar to our reading in real life and can reflect the effect arising from incremental processing. In comparison with the raw RTs analysis, analysis of residual RTs takes into account of the individual differences in reading speed and the possibly varied word length, and is, thus, especially suitable for calculation if there are differences in the word length in the critical or afterward segments (Marinis, 2010).

For these reasons, the current research employed linear non-cumulative, phrase-by-phrase SPR, and the residual RTs were calculated which will be presented in Chapter Five and Chapter Six.

4.2.3.3 Limitations of Self-paced Reading Tasks

There are some limitations with SRP experiment, including that: it requires relatively fluent readers in the procedure, and the reading mode is somehow different from the natural reading in real life. However, it is argued that these limitations may have little influence on the current research because of two reasons: a) the participants' L2 proficiency was checked to guarantee that they have the ability to comprehend the target sentences. b) given the development of technology like text messaging and using a smartphone to browse a website, the self-paced reading mode that involves pressing a button has become relatively common.

In sum, it is believed that the SPR method is suitable for the current research on L2 learners' sensitivity to anomalies in sentences with non-finite verbs in MVCs, which can tap into learners' implicit knowledge of the salient cues regarding finite and non-finite distinctions. The specific design of SPR, including the number of stimuli and fillers, the stimuli sentences, and other aspects of the experiment set-up, will be described in Chapter Five (Chinese ESL learners' processing of English MVCs) and Chapter Six (English CSL learners processing of Chinese MVCs).

4.2.4 Other Instruments

4.2.4.1 L2 Proficiency Tests

The Oxford Placement Test (OPT) (Allan, 1992) (see Appendix 3) was used to assess the level of English proficiency of a group of Chinese ESL learners. It is a reliable and efficient method of assessment and is composed of two sections per test paper: a listening test and a grammar test. The grammar part is composed of 100 items, which usually takes up to an hour to complete. Considering the whole experiment time

and research goal, it was decided to use the first 50 grammar test items as the proficiency test, as has been done previously in comparable research (e.g., Marinis, Roberts, Felser & Clahsen, 2005; Roberts & Felser, 2011; Roberts & Liszka, 2013).

The materials for Chinese as L2 proficiency test (see Appendix 8) were chosen from the HSK (Hanyu Shuiping Kaoshi, "National Chinese Proficiency Test") Band 4 and Band 5 model tests. There are 6 bands in total, of which band 4 is "designed for learners who can discuss a relatively wide range of topics in Chinese and are capable of communicating with Chinese speakers at a high standard" and band 5 is "designed for learners who can read Chinese newspapers and magazines, watch Chinese films and are capable of writing and delivering a lengthy speech in Chinese" (Hanban, n.d.).

4.2.4.2 Background Information Questionnaire

The background information questionnaire (see Appendix 2; for the Chinese version, see Appendix 7) comprises 15 items. It was designed to provide information on the participants' name, sex, age, level of education, profession, country, native language, self-reported L2 proficiency, age and data regarding the learning of other languages, natural exposure to other languages, experience of living overseas, daily usage of L1 and L2, self-reported preferences related to learning new languages, and other remarks concerning language. This questionnaire assesses both the general language background and individual differences in language learning, which will assist us in explaining the experiment results.

4.2.4.3 Participant Consent Forms

The Ethics Committee of the University of York approved the data collection methodology and participants' consent form (see Appendix 1; for the Chinese version, see Appendix 6). The participants read the consent form prior to participating in the

study. The forms were created in both English and Chinese, and the participants read the forms in their mother tongue. They were informed of the experiment's duration, purpose, and requirements.

In general, regarding English as L2 learning, the CLEC corpus, untimed GJT, and online SPR experiments are used to examine L2 learners' respective misuses in interlanguage, test metalinguistic knowledge and explore their online sensitivity to L2 salient cues in processing English MVCs.

The background information and Oxford placement tests are provided to assist with checking the role of L2 proficiency in metalinguistic knowledge and processing. Regarding Chinese as L2 learning, the HSK dynamic composition corpus, GJT and SPR are used to investigate the interlanguage, metalinguistic knowledge and online processing of English CSL learners. The HSK model test is used to grade Chinese as L2 proficiency and self-assessment data are collected to check the learners' background. The above- mentioned methodology is described in Table 9.

Table 9 *A Summary of the Research Groups, Background and Instruments*

Directions	Groups	Background	Instruments
English as L2	Control group: English native speakers	Personal data (age, sex, exposure, etc.)	CLEC corpora GJT SPR
	Experiment group: Chinese ESL learners	L2 Proficiency (Oxford placement test)/personal data	
Chinese as L2	Control group: Chinese native speakers	Personal data (age, sex, exposure, etc.)	HSK dynamic composition corpora GJT SPR
	Experiment group: English CSL learners	L2 proficiency (HSK model test)/ personal data	

4.3 Chapter Summary

The previous research on the learning of multi-verb constructions in the L2 tends to be based on error analysis. The discussion of the morphosyntactic features of finite and non-finite distinctions in Chinese tends to be mainly on the theoretical level, and few previous attempts have been made to explore its influence on L2 learning, so research gaps exist between the theories of semantic finiteness and its influence on L2 learning, as well as between error analysis in production and the cross-linguistic perspective in both production, comprehension, and online processing.

To gain a more comprehensive idea of its cross-linguistic influences, the present study will undertake a bidirectional comparison. Based on the comparison of Chinese and English MVCs, a general question about how the differences between morphological finiteness and semantic finiteness will influence learners' acquisition and processing of MVCs in the L2 was proposed, which was further divided into six sub-questions, covering the production, comprehension and online processing of MVCs in English or Chinese as L2, respectively. This question will be answered in Chapter Five and Chapter Six. The exploration of this question is very important in helping us to understand how cross-linguistic finiteness differences in linguistic-distant language systems influence the study of MVCs in L2, and in filling the gap regarding the scarcity of time-course L2 parsing studies.

To answer the research questions, different kinds of research methods are employed. In investigating the production of MVCs in L2 English and L2 Chinese, large-scale learners' corpora are employed, providing naturalistic, large-scale data to investigate learners' production of MVCs. To explore the metalinguistic knowledge of finiteness in MVCs, offline grammatical acceptability tests are used, which will

complement the interlanguage descriptions derived from the corpus analyses and also provide metalinguistic comprehension/production data. To research the sensitivity to salient cues during real-time L2 processing, self-paced reading is employed to build up a picture of the learners' implicit knowledge. Proficiency is measured via OPT and HSK tests and a questionnaire is used to gather data on the learners' language background.

The specific experimental design, data analysis, and conclusions will be presented in Chapter Five and Chapter Six.

5. Chapter Five Cross-linguistic Influence on Chinese ESL Learners' Acquisition and Processing of English MVCs

In this chapter, I will give an account of the corpus-based analysis of the production of MVCs by Chinese learners of English, as well as offline and online experiments on their explicit and implicit knowledge of the salient cue to distinguish English finite and nonfinite verbs. Before that, a brief review of the similarities and differences between Chinese and English sentences with multiple verbs will remind us of the theoretical basis.

Chinese and English MVCs show differences in morphology and salient cues to distinguish the matrix verbs from other verbs (see Table 10). In English MVCs, there exists a clear distinction between the matrix and other verbs that is distinguishable via the morphology in the form of either finite verbs or non-finite verbs, regardless of what function the latter perform. In comparison, Chinese MVCs are classified into two types; that is, they either have a finite and non-finite distinction, like sentences with a verb-subject or a verb-object, or have more than one interpretation of finiteness, like in pivotal and serial-event sentences. In the first type of sentence, with a semantic [+-F] distinction, nonfinite verbs are bare verbs, while finite verbs can combine with aspectual particles. In the second type of sentence, there are two interpretations: without the aspectual morphemes after V_2, V_2 is non-finite, however, with the aspectual morphemes after V_2, both verbs are finite (see examples in Table 10).

Table 10 *A Comparison* *between English and Chinese MVCs*

Cross-linguistic Difference Type I: with a similar finite and non-finite distinction

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English [-F] as subject

Smoking	harmed	his	health.
[-F]	[+F]		
No tense	With tense		

Chinese verb subject

Xiyan	weihai le	tade	jiànkāng.
smoke	harm PFV	his	health.
[-F]	[+F]		
No aspect	With aspect		

English [-F] as object

Workers	stopped	working.
	[+F]	[-F]
	With tense	No tense

Chinese verb object

Gōngrénmen	tíngzhǐ le	gōngzuò.
worker	stop PFV	work.
	[+F]	[-F]
	With aspect	No aspect

Cross-linguistic Difference Type II: English with a finite and non-finite distinction vs. Chinese pivotal/serial-events sentences

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English [-F] as object complement

The boss	encouraged	him	to attend	the meeting.
	[+F]		[-F]	
	With tense		No tense	

Chinese pivotal sentence

Lǎo bǎn	gǔlì	tā	cānjiā / le	huìyì.
The boss	encourage	him	attend PFV	the meeting.
[+F]			[-F]/ [+F]	
With aspect			No aspect/with aspect	

English [-F] adverbial

He	bought	a ticket	to enter	the theatre
	[+F]		[-F]	
	With tense		No tense	

Chinese serial-event sentences

Tā	mǎi	piào	jìn/ le	jùyuàn
He	buy	a ticket	enter PFV	the theatre
[+F]			[-F]/ [+F]	
With aspect			No aspect/with aspect	

On basis of the two types of Chinese MVCs, two types of cross-linguistic differences between Chinese (L1) and English (L2) are evident. In type I, MVCs are semantically similar between the two languages and any learnability problems are predicted to be found with regard to the morphology: the problem of mapping the non-finite meaning to the correct forms (-*to do*, -*ing*). For instance, in the Chinese sentence d*úshū gǎibiàn le tade mìngyùn*, "read change PFV his life", the non-finite verb "d*úshū*" (read) takes the form of a bare verb, while in the counterpart English sentence *reading changes one's life*, the non-finite verb takes the "-*ing*" form.

In type II, MVCs are similar between English and Chinese in terms of word order, but differ with regard to the underlying relations between the two verbs, as they have finite and non-finite distinctions in English while multiple verbs can be both finite to indicate the completeness of the event continuum in Chinese. So the learnability problem concerns how to map the proper form to the appropriate meaning. For instance, in the Chinese sentence "*Lǎoshī qǐng tā chīle jiǎozi.*" (teacher invite he eat PFV dumplings), both "*qǐng*" (invite) and *"chī"* (eat) are in perfective aspect, while in the reminiscent English sentence "the teacher invited me to eat dumplings", "invite" is finite and "to eat" is non-finite. Even though without "*le*", the V_2 *"chī"*(eat) is non-finite, the existence of the Chinese cases that both verbs are finite in pivotal sentences may still have an influence on the L2 production. Based on transfer theories suggesting that these cross-linguistic differences will lead to a negative transfer from the L1 to L2 (Odlin, 1989), and the evidence of syntactic transfer from previous studies (e.g., Chan, 2004; Green 1996; Helms-Park, 2001, 2003; Hertel, 2003; Matthews & Yip, 2003; Sabourin, 2001; Xiao, 2002; Yip, 1995; Yip & Matthews, 1995), learners are

predicted to transfer the "finite+finite" forms from Chinese pivotal and serial-events sentences to the L2.

In this chapter, the above-outlined cross-linguistic differences are investigated via learners' production (via corpus analysis), explicit knowledge (via grammaticality judgment tests) and implicit knowledge (measured via an SPR task). Sections 5.1-3 describe these tests in detail.

5.1 Corpus-based Analysis of Chinese ESL Learners' Written Production

In the present study, corpus-based analysis is adopted to answer three research questions:

What non-target-like usage do Chinese ESL learners engage in regarding English MVCs?

Where non-target-like usage is observed, does this reflect cross-linguistic differences between English and Chinese MVCs?

Do sentence types and L2 proficiency affect the pattern of usage?

5.1.1 Method

5.1.1.1 Chinese Learners' English Corpus (CLEC)

Several contemporary large-scale Chinese learners' English corpora have been created since 2000, such as the Chinese Learner English Corpus (CLEC) (Gui & Yang, 2003), the College Learners' Spoken English Corpus (COLSEC) (H. Yang & Wei, 2005), the Spoken and Written Corpus of Chinese Learners (SWECCL) (Q. Wen, Wang, Liang, & Yan, 2005), the Parallel Corpus of Chinese EFL Learners (PACCEL) (Q. Wen & Wang, 2008) and several international learners' interlanguage corpora, such

as the International Corpus of Learners' English (ICLE) Corpus, and the Chinese sub-corpus (Granger, 2002). Among these copora, CLEC is the only one that covers learners of different proficiency levels, in contrast to the others, where only the compositions or oral data of university students have been collected. In CLEC, a million words from English compositions have been collected from five different levels of Chinese learners of English, and are tagged with 61 types of misuse (excluding stylistic errors and error sources, which are difficult to tag objectively and consistently). With its wide range of subjects' compositions and clear tags, CLEC was chosen as the database for a corpus-based analysis of English MVCs usage by different levels of Chinese learners.

The Chinese Learners' English Corpus (CLEC) was constructed through the joint efforts of Guangdong Foreign Studies University, Shanghai Jiaotong University and several other universities, as the first English learners' corpus in China, and was published in 2003. It comprises more than 1,000,000 words from the interlanguage production of Chinese learners from different backgrounds and with varying levels of proficiency, and includes five sub-corpora: St2, St3, St4, St5 and St6 (Gui & Yang, 2003). It is a pool of written compositions gathered from formal tests with the same topic and requirements and within time limitations. Table 11 provides information on the five sub-corpora.

Table 11 *Distribution of Words across the Five Sub-corpora in CLEC (Gui & Yang, 2003, p. 2)*

Corpus	Proficiency	Words count
St2	Senior high school students	208088
St3	Freshmen and sophomores of non-English majors, with approximately the level of CET4.	209043
St4	Juniors and seniors of non-English majors, and with approximately the level of CET6.	212855
St5	Freshmen and sophomores of English majors	214510
St6	Juniors and seniors of English majors	226106
In total		1070602

CLEC contains tagged texts in which the non-target-like usage is classified into two tiers. The first tier has 11 types, including word forms (fm), verb phrases (vp), noun phrases (np), pronouns (pr), adjective (aj), and etc. And the second tier is the subdivisions under the first tier, such as the vp1 under the vp tier meaning "pattern" misuses, vp2 meaning "set phrase" misuses. The misuses of the finite/non-finite verbs are "vp4" (mistakenly using finite verbs for non-finite verbs or vice versa) and "vp5" (the misuse of an infinitive for a participle or vice versa, and an *-ed* participle for an *–ing* participle or vice versa). Misuse tags are inserted when misuse occurs, marked by square brackets. For example, "suddenly I saw dad sat [vp4,2-] in a chair". "2-" shows the scope of misuse occurrence: "-" means "before" the misuse; "2" means that the word which can help to diagnose the misuse is two words before the misuse. On the whole, 61 types of misuse (e.g., fm1: word spelling; fm2: word building; fm3: capitalization; np1: noun pattern; np2: noun set phrase, and etc.) are identified in this corpus, ranging across the sentence, phrase and word level.

5.1.1.2 Participants

The current research chose three sub-corpora as the experiment participants to cover low, intermediate and high proficiency Chinese learners of English:

St2: senior high school students, age range: 16-18;

St4: junior and senior undergraduates of non-English majors, age range: 20-23;

St6: junior and senior undergraduates of English majors, age range: 20-23.

In the corpora analysis, St2 participants were regarded as low-proficiency learners in the corpus. Senior high school students in China have learned the English grammar rules about non-finite verbs in the classroom according to the *National Full-time Senior High School English Syllabus (Revised).* The Syllabus states that senior high students should possess a vocabulary of 1,200 words plus a certain number of phrases and idioms that they can use them in composition writing. Students can use the general reading skills to grasp the central ideas, the main facts, the logical clues, and the temporal and special information within the reading materials. Students can use grammatical rules, including those related to non-finite verbs, to write simple letters, notes and notices, and also write around 80 words within 30 minutes (China Ministry of Education, 2004).

Learners in St4 are considered to be the intermediate-proficiency group. Learners in St4 are juniors and seniors of non-English majors at the approximate level of the College English Test Band 6 (CET6, an intermediate-level English test). CET 6 has a higher requirement than CET 4, and is regarded as a medium-level test. The participants in this corpus can meet the general requirements of the college English syllabus. Their vocabulary may be up to 4,795 words and 700 phrases (including

vocabulary learned in secondary school), and their reading speed can be 70 words per minute. In writing tasks, they are supposed to be able to describe their personal experience, perceptions, feelings, events, and write at an essay containing at least 120 words within 30 minutes, with a clear theme, appropriate words, coherent language and correct grammar (Higher Education Department of the Ministry of Education, 2006).

The St 6 group, namely the 3rd and 4th year English majors, are supposed to be approximately at the level of the Band 8 "Test for English Majors" (TEM 8), which is the highest English proficiency level in China. They are required to master 7,000-12,000 words and be able to read magazines, political essays (e.g., The *New York Times*), novels (e.g., *The Great Gatsby*), and historical biographies (e.g. *The Rise and Fall of the Third Reich*) at a speed of 140-180 words per minute. They should be able to write a summary of the novel, book reports, course papers, and formal letters using correct, coherent language, and appropriate expressions and also be able to express their understanding and thoughts effectively, as well as write an essay of 250-300 words in 30 minutes (Committee of Foreign Language Teaching in Colleges and Universities, 2000). The 3rd and 4th year English majors in St6 are ranked as high-proficiency English learners.

In general, the three groups of learners can well represent low, intermediate and high proficiency learners in China through their graded amount of vocabulary and phrases, reading speed, grammar learning, words per composition as stated in the national syllabus. A summary of learners' proficiency levels in St2, St4 and St6 are listed in Table 12.

Table 12 *Proficiency Levels of Sub-corpus St2, St4 and St 6 in CLEC*

Sub-corpora	Subjects' vocabulary (words)	Production (words/ 30 minutes)	Reading speed (words/ minute)	Grammar	Exams	Proficiency level
St2	1200	80	can generally understand the text	learn some of the basic grammar (including: tense, non-finite verbs)	National college entrance exam	low
St4	4790	120	70	finish all the grammar learning	Band 6 College English Test	intermediate
St6	7000-12000	250-300	140-180	more familiar with the grammar and can use them correctly	Band 8 Test for English Majors	high

5.1.1.3 Coding and Analytical Procedure

In the corpus, verb phrase misuse was tagged as vp, and classified into 9 types. These are, respectively: transitivity, set phrases, agreement, finite/non-finite, non-finite, tense, voice, mood, and modal/ auxiliary. Among the verb phrase misuses, vp4 and vp5 are related to our research questions.

Vp4, finite/non-finite misuse, includes mistakenly using finite verbs for non-finite verbs or vice versa, e.g., *I call on Chinese women become [vp4,5-] more conscions about themselves* (St6). Vp5, includes the misuse of an infinitive for a participle or vice versa, and an *-ed* participle for an *–ing* participle or vice versa. e.g., *The doctor asked me to stay hospital observing [vp5,7-]* (St2). Vp4 and vp5 account for 10.93% of the total verb phrase misuse in St2, 9.66% in St4, and 9.75% in St6 (Gui & Yang, 2003).

The sentences containing misused finite and non-finite verbs were extracted from the corpora by searching for vp4 and vp5 in the raw compositions. The extracted data were then re-tagged according to which was the misused verb, its syntactic position, misused form, and corrected form. Table 13 shows the method of coding.

The retagged sentences that involved non-finite verbs as the attribute and appositive (which are unrelated to the research purpose) were removed. Before the data analysis, normalization was performed by dividing the raw misuse figures by the total word count of sub-corpus and the results multiplied by 200,000 (the total word count in each sub-corpus is over 200,000).

Table 13 *Coding Method of Finite and Non-finite Verbs-related Misuses in St2, St4 and St6 Sub-Corpus*

Criteria of coding	Coding methods
Which is the misused verb	1= V1. 2=V2. Correct/other mistakes=0
Syntactic position of misuse	1=subject. 2=predicate. 3=object. 4=attribute. 5=adverbial. 6=object complement. 7=appositive
Misused form	1=bare verbs. 2=doing. 3=to do. 4=done. 5=over-inflection. 6=to do variants (e.g. to doing, to does, to did)
Corrected form	1=do. 2=doing. 3=to do. 4=done. 5=do variant

After normalization, the misuse figures for each sub-corpus are based on an identical number. The misuse was categorized into bare verbs, *to-do* variants (e.g., *to does, to did, to doing*), over-inflection (meaning overinflecting the nonfinite verbs according to tense), and mixed-usage (referring to the mixed usage of non-finite forms, including the infinitive for the participle or vice versa, and an *-ed* participle for an *–ing* participle or vice versa) in order to gain a clear view from the perspective of L1

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influence. The examples are as follows:

(17) a. Bare verbs: <u>Protect</u> the environment is a very important thing. (St2)

b. To-do variants: At last, Crouse made up his mind <u>to killed</u> the savages as soon as they came. (St2)

c. Over-inflection: Our parents come to our school <u>took </u>part in the parents' meeting. (St2)

d. Mixed-usage: <u>Comparing</u> with the English course in other universities, the CECL course in GIFL is different. (St6)

The sentence types were defined according to the syntactic position of the non-finite verbs, which are respectively in subject, object, object complement and adverbial. The following are examples of the different sentence types.

(18) a. In subject: <u>Get</u> up early can give you a good habit. (St2)

b. In object: At this very moment, we begin <u>to realized</u> that what makes us so unable, dependent and indecisive, is our "lovely" teaching system of our "lovely" ivory tower. (St6)

c. In object complement: In January 15th, of 1991, Gorge Bush, the president of the United States, ordered the American air force <u>attacked</u> the goals in Iraq. (St6)

d. In adverbial: We used the spades <u>put</u> the leaves into the basket. (St2)

In addition to the retagging and classification of misuses, we also calculated the total usage of non-finite verbs in the corpus by using software "AntConc 3.5.7", with the purpose of examining the proportion of misusages (vp4, vp5) in the total usage. The total usage of non-finite verbs includes "*to* infinitives, gerunds, and past

participle". Present and past participles with copula and auxiliaries forming predicate or passive voice were not included in the total usage of non-finite verbs, because misuses of these types were regarded as "tense" (vp6) or "voice" (vp7) rather than "non-finite usage" (vp4, vp5) in the Corpus (see Gui and Yang, 2003).

5.1.2 Results

The adjusted misuse figures of low, intermediate and high proficiency Chinese ESL learners regarding finite/non-finite and non-finite verbs are listed in Table 14. It shows that, unsurprisingly, the misuse in the production of non-finite clauses decreases with increasing proficiency, and learners of above-intermediate proficiency produced more non-finite clauses than low-proficiency learners.

Table 14 *Description of Misuses and Total Usage of Non-finite Verbs in the St2, St4 and St6 Sub-Corpus*

Corpus	Proficiency Levels	Misuses			Total Usage			
		Vp4	Vp5	Total	to infinitives	Gerund	Past partic-iple	Total
St2	Low-proficiency learners	140.8	140	280.8	3345.7	2336.5	160.5	5842.7
St4	Intermediate-proficiency learners	110.8	107.4	218.2	5005.3	4143.7	186.0	9335
St6	High-proficiency learners	51.6	46.7	98.3	4553.7	4147.6	508.6	9209.9

Misuses were retagged during the above-mentioned coding method. The adjusted misuse figures, with different forms in different sentence types among low, intermediate and high proficiency learners, are shown in Table 15.

Table 15 *Numbers and Percentage of Misuses among Low-, Intermediate- and High-Proficiency Chinese ESL Learners in CLEC*

Groups	Misuses	In subject (%)	In object (%)	In object complement (%)	In adverbial. (%)
Low prof.	Bare verbs	15.38 (80.02)	17.30 (47.37)	15.38 (36.37)	28.83 (44.77)
	Over-inflection	0.00 (0.00)	0.96 (2.63)	16.34 (38.64)	22.11(34.33)
	To do variants	2.88 (14.98)	17.30 (47.37)	3.84 (9.08)	9.61 (14.92)
	Mixed-usage	0.96 (4.99)	0.96 (2.63)	6.73 (15.91)	3.84 (5.96)
	Total	19.22 (100.00)	36.52 (100.00)	42.29 (100.00)	64.40 (100.00)
Intermediate prof.	Bare verbs	36.64 (95.12)	23.49 (43.86)	9.40 (45.48)	19.73 (58.32)
	Over-inflection	0.94 (2.44)	2.82 (5.27)	3.76 (18.19)	0.00 (0.00)
	To do variants	0.94 (2.44)	21.61 (40.35)	0.94 (4.55)	6.58 (19.45)
	Mixed-usage	0.00 (0.00)	5.64 (10.53)	6.58 (31.83)	7.52 (22.23)
	Total	38.52 (100.00)	53.56 (100.00)	20.67 (100.00)	33.83 (100.00)
High prof.	Bare verbs	5.31 (60.00)	1.77 (15.39)	3.54 (22.24)	7.08 (38.11)
	Over-inflection	1.77 (20.00)	2.65 (23.04)	2.65 (16.65)	2.65 (14.26)
	To do variants	0.88 (9.94)	3.54 (30.78)	1.77 (11.12)	4.42 (23.79)
	Mixed-usage	0.88 (9.94)	3.54 (30.78)	7.96 (50.00)	4.42 (23.79)
	Total	8.85 (100.00)	11.50 (100.00)	15.92 (100.00)	18.58 (100.00)

Note. Prof. = proficiency, (%) = the percentage of certain misused form in the total misuses with this group of learners.

It is shown in the table that the dominant misused forms were different in English [-F] (non-finite verbs) as subject, object, object complement and adverbial sentences. In sentences with [-F] as the subject, the dominant types of misuse were bare verbs, as in example (19). This was prominent across all groups: the misuse count in the low-proficiency group was 15.38, which amounted to 80.02% of the total misuse. In the intermediate-proficiency group, it was 36.64, with up to 95.12% of the total misuse; while in the high-proficiency group, even though the misuse count of bare verbs fell dramatically to 5.31, it still occupied a high percentage of 60%.

(19) Bare verbs: <u>Get</u> up early can give you a good habit. (St2)

In sentences with non-finite verbs as the object, both bare verbs and to-do variants (see example 20) were prominent among low and intermediate proficiency learners. In the low-proficiency group, the misuse counts of bare verbs and to-do variants were, respectively, 17.30, 17.30, and they constituted 47.37% and 47.37% of the total misuse; in the intermediate-proficiency group, there were, respectively, 23.49, and 21.61, which are 43.86% and 40.35% of the total misuse. However, bare verbs (misuse count: 1.77, percentage: 15.39%) and to-do variants (misuse count: 3.54, percentage: 30.78%) were not prominent among the high-proficiency learners, which group instead, had a more even distribution of misused forms.

(20) a. Bare verbs: The two cheats … pretended <u>work</u> hard at the empty looms.

b. To-do variants: At this very moment, we begin <u>to realized</u> that what makes us so unable, dependent and indecisive, is our "lovely" teaching system of our "lovely" ivory tower. (St2)

In non-finite verbs as object complement sentences, the main misuse of low proficiency learners was bare verbs (misuse count: 15.38, percentage: 36.37%) and over-inflection (misuse count: 16.34, percentage: 38.64%). The misuses are as shown in example 21. In contrast, intermediate and high proficiency learners mainly made mistakes related to bare verbs and mixed-usage (see example 21): these were, respectively, 9.40 (45.48%) and 6.58 (31.83%) in the intermediate-proficiency group, and 3.54 (22.24%) and 7.96 (50.00%) in the high-proficiency group. The intermediate and high proficiency learners were similar with regard to dominant misused forms, but different from the low proficiency learners.

(21) a. Bare verbs: Before long the boy … taught him <u>do</u> the thing what the people can do.

b. Over-inflection: In January 15th, of 1991, Gorge Bush, the president of the United States, ordered the American air force <u>attacked</u> the goals in Iraq.

c. Mixed-usage: We found the bikes disappearing. (St2)

In non-finite verbs as adverbial, misuses in the form of bare verbs and over-inflection were also prominent among low proficiency learners (28.83 (44.77%) and 22.11 (34.33%)), but not among the other two groups. Bare verbs were dominant, but mixed-usages and *to-do* variants were evenly distributed within the intermediate-proficiency group: the misuse count of bare verbs was 19.73 (58.32%), mixed-usage was 7.52 (22.23%) and *to-do* variants was 6.58 (19.45%). In the high-proficiency group, the misuse count of bare verbs was 7.08 (38.11%), mixed-usage was 4.42 (23.79%), and *to-do* variants was 4.42 (23.79%). See example 22.

(22)　a. Bare verbs: Sometimes the cat took the plows <u>catch</u> it.

b. Over-inflection: Mary Hunter, the professor's daughter, was catch a call and went to the hospital <u>saw</u> her friend that morning.

c. To-do variants: I'm going to my cousin <u>to learning</u> how to operate the computer. (St2)

Generally speaking, in different sentence types, the dominant misused forms differed, and L2 proficiency was also found to be an important factor. High proficiency learners engaged in a small amount of misuses in all the sentences with [-F] (total count, 58.85) and did not show a clear tendency with regard to using certain forms. Low-proficiency learners had the largest misuse figures (total count, 162.43), reflected by their prominent use of bare verbs as the subject (15.38), bare verbs and *to-do* variants as the object (17.30, 17.30), bare verbs and over-inflection as the object complement (15.38, 16.34) and adverbial (28.82, 22.11). The intermediate-proficiency learners' total misuses lay between that of the other two groups (146.38), and the dominant misused forms were like those of the low-proficiency learners in [-F] as the subject (bare verbs 36.64) and object (bare verbs 23.49 and *to-do* variants 21.61), but similar to the high-proficiency learners with regard to [-F] as the object complement (bare verbs 9.40, mixed-usage 6.58) and adverbial (bare verbs 19.73, mixed-usage 7.52, and *to-do* variants 6.58). It thus shows that over-inflection mainly occurred in sentences with [-F] as the object complement and adverbial among low-proficiency learners. To obtain a clear view of the distribution of the prominent misused forms within the four sentence types among the low-, intermediate-, and high-proficiency learners, a bar chart is presented in Figure 2.
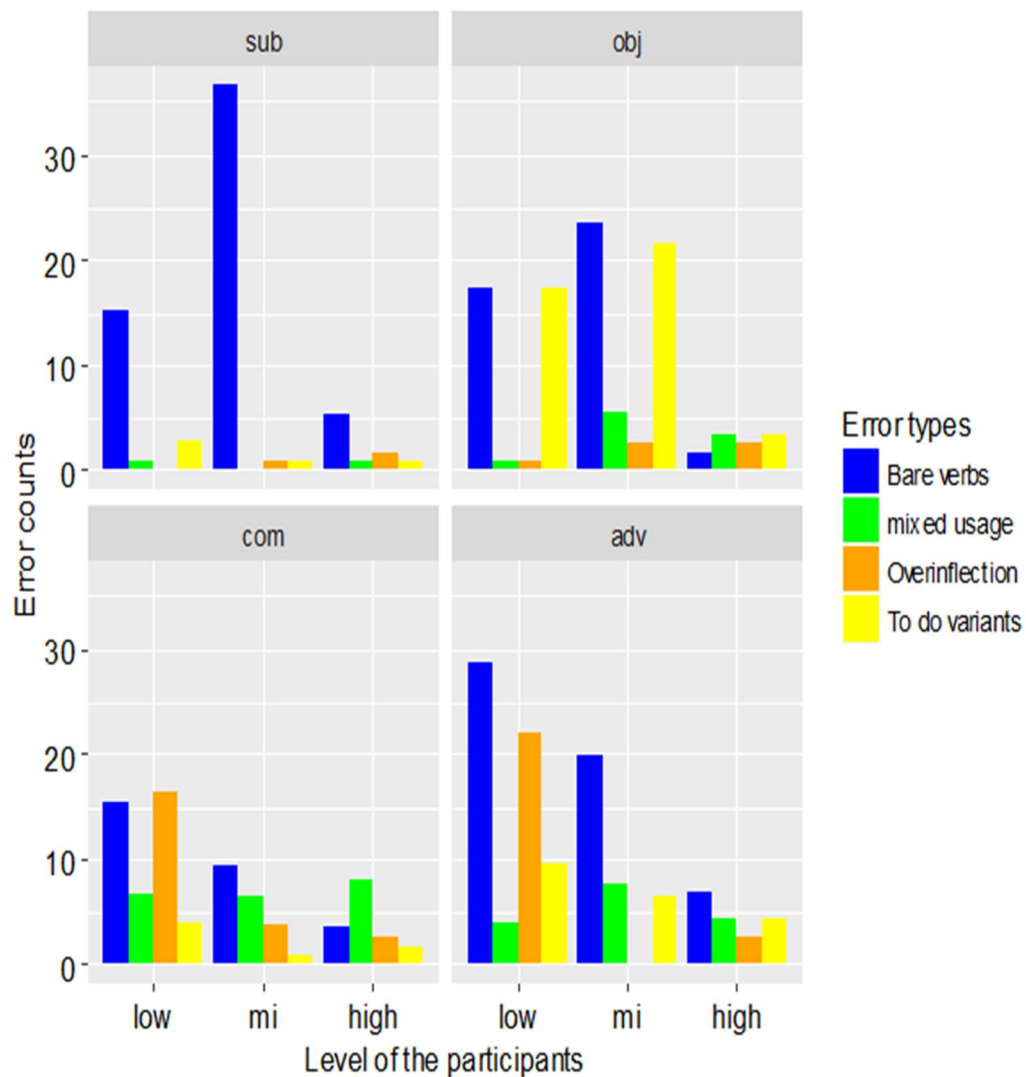
Figure 2. Chinese ESL learners' misused forms and proportion in [-F] as subject

(sub), object (obj), object complement (com) and adverbial sentences (adv)

In sum, in sentences with [-F] as the subject, all levels of proficiency groups misused similar forms (bare verbs). In sentences with [-F] as the object, the low and intermediate proficiency learners misused similar forms (bare verbs and *to-do* variants). In sentences with [-F] as the object complement or adverbial, the intermediate and high proficiency learners misused similar forms (bare verbs and

mixed-usage) while the low proficiency learners widely misused bare verbs and over-inflection.

5.1.3 Discussion

The corpus analysis revealed four types of misuses related to non-finite verbs, i.e., bare verbs, *to-do* variants, over-inflection, and mixed-usage. Both sentence type and L2 proficiency are influential factors. Cross-linguistic influences and other L2 developmental problems are argued to be the reasons for this.

5.1.3.1 Cross-linguistic Influence

Corpus-based analysis showed that Chinese ESL learners' dominant misused forms were different in different sentence types, i.e., sentences with [-F] as subject, object, object complement and adverbial. One interpretation of this is the cross-linguistic influence.

Cross-linguistic differences between the use of verbs as subject or object in Chinese and English concern morphology. The verbs as subject or object are bare in Chinese and semantically non-finite, whereas they are in the "*-ing*" or "*to infinitives*" in English and so, morphologically, non-finite. In comparison with the bare verbs in Chinese learners' L1, "*-ing*" or "*to*" to indicate the non-finiteness appear to be redundant. Learnability problems that result from the mapping between the non-finite meaning and forms (*-ing, to-infinitives*) were predicted. The corpus analysis above confirmed this prediction and showed that the most frequently misused form was bare verbs, which appeared among learners of different proficiency levels. Based on the transfer analysis which compares interlanguage-target language discrepancies, it was observed that the interlanguage resembled the Chinese equivalent MVCs via a word-

by-word translation, and was thus attributed to L1 transfer. High proficiency learners made dramatically fewer mistakes regarding the use of bare verbs, although bare verbs were a problem for both low and intermediate proficiency learners and common among all sentence types.

In another type of comparison, namely [-F] as object complement sentences vs. pivotal sentences, V_2 in English is non-finite, while V_2 with aspectual morphemes in reminiscent Chinese pivotal sentences is finite. Li and Cheng (2008) stated that "in a pivotal sentence, the aspectual particle '*le*' cannot be used after the first verb predicate. It must be put after the verb predicate that follows the pivot" (p. 489). For instance, it is grammatical to say "*Wǒ yǐjīng ràng xiǎo huá qùle yī tang*" (I already let xiaohua go PFV one time), but ungrammatical to say "**Wǒ yǐjīng ràng le xiǎo huá qù yī tang*" (I already let PFV xiaohua go one time). Xing (2004) has examined pivotal constructions in the verb usage dictionary (Meng, Zheng, Meng, & Cai, 1999) and found that, of the 1,328 verbs contained therein 180 (13.55%) can be used as V_1 in pivotal constructions. In the pivotal sentences containing these 180 verbs, the aspectual particle "*le*" mostly appear after V_2 rather than V_1. The aspectual morpheme "*le*" modifies the compound predicate in which verb 1 and verb 2 share one temporal category, and both are finite.

Similarly, Chinese serial-events sentences are reminiscent with English sentences with [-F] (V_2) as adverbial, however V_2 in Chinese is finite. Li and Cheng (2008) stated that "in a sentence with verbal constructions in series, if one wants to emphasize the completion of an action, one normally puts the aspectual particle *le* at the end of the sentence, or after the second predicate verb". For example, "*wǒmen qù yuèlǎnshì kànle yī huǐ huàbào*" (we go to reading room read PFV a while a pictorial). Thus, the cross-linguistic difference between the L1 (Chinese) and L2 (English) is on morpho-

syntactic level in nature.

The misuses found in the corpus showed that bare verbs and over-inflections were both prominent misused forms among all misuses in low-proficiency learners' group. Bare verbs, as stated above, may reflect the fact that Chinese is not an inflected language. Over-inflection means an infinitive with the past tense marker "-*ed*". The over-inflection of the V$_2$ which encodes the temporal information to indicate the completeness of the sub-event is strongly reminiscent of the normative sentence structure of Chinese pivotal sentences and serial-event sentences. Over-inflection, as the morphology of verbs with tense, which allows the co-occurrence of temporal information with more than one verb, blurs the distinction between finite and non-finite verbs. And with two verbs in one temporal category, Chinese ESL learners may have transferred the corresponding Chinese features in finiteness to English. The fact that no over-inflections relating to the third person singular "-*s*" were found confirms that this is cross-linguistic influence rather than L2 developmental or other problems. Because there is no third person singular marker in Chinese and, if this was due to developmental problems (such as a lack of the knowledge of non-finiteness or its forms), over-inflections including the third person singular might have occurred. The relatively small amount of over-inflection misuse in sentences with [-F] as the subject or object also suggests influence by Chinese pivotal sentences and serial-event sentences because "*le*" is not allowed after the verb subject or object in Chinese and no syntactic transfer occurred in sentences with [-F] as subject or object. Over-inflection was only prominent among low-proficiency learners, which implies an L2 proficiency factor in morpho-syntactic transfer; that is, morpho-syntactic transfer mainly occurs among low-proficiency learners.

Typological features in ESL learners' production have been noticed in a vast body of previous research. English learners from a Vietnamese background produced a lot of causative serial verb constructions (e.g., *cook butter melt*) which resembled their native language from the lexicosemantic aspects and were not found among English as L2 learners from a Hindi-Urdu background (Helms-Park, 2001, 2003). Chinese ESL learners produced L1 reminiscent properties in verb transitivity (e.g., *I like listen music*); relative clauses (e.g., * she do this thing is my most important thing in my life*); topicalization (e.g., * And played the table-tennis I am very bad*); position of adverbs (e.g., * she very much likes dancing*); and existential sentences (e.g., * there has a book on the table*) (Chan, 2004; Matthews and Yip, 2003). Even though a number of studies have found negative transfer from the L1, "the questions of which characteristics of the native language transfer, which transferred properties play a more fundamental role in defining the interlanguage grammar, and what their precise effect is on second language learning, are far from resolved" (Bliss, 2006, p.1). The present study observed two forms of misuses, bare verbs and overinflection, which were argued to be attributed to cross-linguistic influence, as a reflection of morphological and morpho-syntactic transfer. L2 proficiency was found to be an important factor in the misused forms and numbers. Bare verbs were the dominant misused form in all sentence types among learners with different proficiency levels, but the total misuse counts of high-proficiency learners were far lower, indicating that high-proficiency learners are less influenced by morphological transfer. Over-inflection was only prominent among the low-proficiency learners, while the intermediate and high proficiency learners misused this form less frequently. This suggests that low proficiency learners are more likely to be influenced by the morpho-syntactic features of the L1, and with the development of L2 proficiency, this influence dramatically

declines.

These findings are in line with the earlier claims that the language distance between the L1 (Chinese) and the L2 (English) poses learnability problems in SLA, and that such differences may have negative influences on the L2 acquisition: "the extent of syntactic transfer is particularly large for complex target structures and among learners of lower proficiency levels" (Chan, 2004, p. 69). The results also provide an explanation for the contradictory findings of Chang (2005) and S. Yang and Huang (2009)'s studies, in which the former argued that no over-inflection in non-finite positions was found among Chinese ESL learners while the latter observed this. The different conclusions may result from the different classifications of L2 proficiency, as the former study regarded primary school students as low-proficiency learners while the latter college undergraduates. Our analysis of large-scale learner corpora avoids the limitation associated with using a small sample and confirms our prediction that L2 proficiency is an important factor regarding what kind of transfer occurs and to what extent transfer is influenced by L1.

Previous studies on past tense, plural and subject-verb agreement (e.g., DeKeyser, 2000; Hawkins & Liszka, 2003; Jiang, 2004) have argued that it is especially difficult for Chinese learners to map the forms which do not exist in their L1 with their functions in English. The present study observed a similar phenomenon, as the Chinese learners of English tended to omit the suffix or "*to*" for expressing non-finiteness (-*ing*, *to*-infinitives). This was found in all types of MVCs, and was especially prominent among low and intermediate proficiency learners. In contrast, morpho-syntactic transfer was observed only in non-finite verbs as object complement and adverbial, and was especially prominent among low proficiency learners. It is in

MVCs, where language differences between morphological and morphosyntactic representations are observed, that we can test the validity of morphological and morphosyntactic transfer and draw comparisons between the learners of different L2 proficiencies. The interaction between the misused forms and L2 proficiency, to some extent, exposes the developmental route of L2 acquisition. In the initial stage, learners are inclined to rely on the sentence structure and forms of the L1 to help to compose sentences in the L2, and both morpho-syntactic and morphological transfer occurs. With the development of L2 proficiency, the influence of the L1 morpho-syntax declines, although morphological transfer persists until they achieve a high level of proficiency.

5.1.3.2 Other Factors Contributing to the Misused Morphology

Despite the considerable evidence supporting the existence of cross-linguistic influence from Chinese to English, other factors, such as false hypothesized concepts, ignorance of rule restrictions or under differentiation and incomplete learning, may also contribute to students' production of the anomalous morphology, as will be explained in detail in the following. "While interlingual misuses are caused mainly by mother tongue interference, intralingual or developmental misuses originate in the following factors: simplification, overgeneralization, hypercorrection, faulty teaching, fossilization, avoidance, inadequate learning, and false concepts hypothesized" (Touchie, 1986, p. 75).

Misused forms of *to-do* variants, prominent in misuses with [-F] as object among low and intermediate proficiency learners, do not readily show any resemblance to their Chinese equivalents. *To-do* variants include morphology like "*to does, to did, to doing*". The non-avoidance of "*to*" indicates that learners were aware of its function

as part of the non-finite morphology. This differs from the misused forms attributed to cross-linguistic influence, because "*to*" was not omitted and inflections were not only limited to the "*-ed*". Thus, it is argued that the *to-do* variants originate from L2 learners' unfamiliarity with the nonfinite forms in English and are ranked as developmental misuses.

Finally, the mixed-usage among the infinitives, present participle, and past participle may be caused by "ignorance of rule restrictions or under differentiation and incomplete learning" (Touchie, 1986, p. 75). The one meaning (non-finiteness) needs to be mapped onto several forms (infinitives, present participle, past participle) and the confusion of forms is possibly the result of unfamiliarity with or non-differentiation of non-finite verbs. A lack of knowledge may lead to confusion regarding the usage, function, connotation and differences related to infinitives and participles.

In short, we rank the *to-do* variants and mixed-usage of non-finite forms to the intralingual misuses that originate from overgeneralization and under differentiation. These are developmental misuses and mainly due to a lack of knowledge. The occurrence of misuses is complex and may be attributed to more than one reason. Apart from cross-linguistic influence, developmental misuses may also contribute to the appearance of bare verbs in learners' interlanguage. It is arguable, for example, that bare verbs are the result of language transfer or simplification and fossilization. Although more research involving a comparison of learners from different language backgrounds is needed, it is argued that L1 transfer, together with other probable developmental problems, contributes to the misuses.

In general, the corpora analysis addressed three research questions: 1) what

problems Chinese ESL learners encounter when producing English MVCs by Chinese ESL learners; 2) whether the cross-linguistic differences between Chinese and English MVCs influence the production of English non-finite verbs, and 3) whether L2 proficiency is an influential factor. The results show that: 1) the intralingual and interlingual misuses took four main forms, i.e., bare verbs, over-inflection, to do variants, and mixed usages; 2) the cross-linguistic influence was reflected as the morphosyntactic transfer of the compound predicates in pivotal and serial-event sentences from the L1 and the morphological transfer of bare verbs from Chinese MVCs; and 3) L2 proficiency is an influential factor, which influences the amount and types of misuses. However, regarding whether the production misuses originated from the learners' lack of metalinguistic knowledge to comprehend the morphological distinction between finite and non-finite verbs remains questionable. To further investigate the cross-linguistic influence on comprehension, offline grammaticality judgment tasks were designed and will be introduced in the next section.

5.1.3.3 Limitations

The first limitation of corpus analysis studies, including the present one, is that learners may employ an avoidance strategy regarding the use of certain properties. Also, the research properties in the samples may be insufficient and the learning problems may not be fully exposed. "Some syntactic structures are difficult to produce by some learners. Consequently, these learners avoid these structures and use simpler structures instead. For example, Arab ESL learners avoid the passive voice while Japanese learners avoid relativization in English" (Touchie, 1986, p. 78).

The second limitation is that a learner corpus is related more to description than interpretation. The production data expose the misused forms and address the possible

reasons by comparing the L1 in a word-by-word literal translation, but the question of whether the misused forms originated from inaccessibility to the [+-F] distinction cannot be explained by the corpora.

To overcome these limitations, experimental data are required to complement the corpus analyses. Several linguists have noted that the combination of naturalistic and experimental data is crucial in providing a deeper insight into the L2 acquisition research (e.g., Gilquin & Gries, 2009). The next section will introduce the grammaticality judgment test that was used to examine the Chinese ESL learners' explicit knowledge of the [+-F] distinction in English MVCs.

5.2 Chinese ESL Learners' Explicit Knowledge of the Finite and Non-finite Distinction in English MVCs

This section specifies the procedure for and results of the grammaticality judgment task. This task is used to complement the naturalistic production data and measurement of learners' metalinguistic knowledge of the morphological [+-F] distinction within English MVCs. English MVCs are distinguished into finite and non-finite verbs, and one of the cues to distinguish them relates to the tense (only finite verbs inflect with tense). The naturalistic, large-sample and homogeneous data within the interlanguage corpora revealed the Chinese-English learners' transfer of morpho-syntactic features (compound predicates in pivotal, serial-events sentences) and morphological features (bare verbs) from L1 to L2, and the higher the L2 proficiency, the less cross-linguistic influence was observed. Despite the L1 transfer that was observed in the production data, the question of whether this transfer originated from a lack of metalinguistic knowledge of the morphological [+-F] distinction remains

unclear. This question is investigated through the grammaticality judgment task.

5.2.1 Question and Hypothesis

The research question is:

Whether Chinese ESL learners have metalinguistic knowledge of the morphological [+-F] distinction in English MVCs and if L2 proficiency affects this.

Hypothesis a: Chinese ESL learners only have metalinguistic knowledge of L2 salient cues in [-F] as subject and object, but not in [-F] as object complement and adverbial as indicated from the corpus.

The corpus analysis showed that the Chinese ESL learners transferred pivotal and serial-events sentences to English sentences with [-F] as object complement and adverbial. It is thus deduced that the transfer of Chinese pivotal and serial-events sentences is originated from the inaccessibility of the [+-F] distinction in English and the lack of metalinguistic knowledge. In light of the production results, it is predicted that Chinese ESL learners will differ significantly from English natives in judging the grammaticality of over-inflected forms as object complements and adverbials in English. With developing L2 proficiency, learners will behave in a more target-like manner.

Hypothesis b: Chinese ESL learners have the metalinguistic knowledge of [+-F] in all types of English MVCs, and the high proficiency learners have more native-like judgment.

Metalinguistic knowledge refers to the grammatical rules that we are explicitly aware of. Cross-linguistic influence on the production and metalinguistic knowledge of the grammatical rules may be inconsistent. Previous studies have shown that

Chinese ESL learners perform better on multiple choice tests than writing tasks with regard to the use of English non-finite verbs (S. Liu, 2012; W. Shi, 2010; L. Yang, 2012). For instance, Chang (2005) argued that Chinese ESL learners possess the knowledge of the English [+-F] distinction. Although these researchers did not probe specific cross-linguistic influence, the results show that Chinese ESL learners performed better on the comprehension of non-finite verbs than on their production. These results support the prediction that Chinese ESL learners have a good understanding of the grammatical rules of English non-finite verbs regardless of their syntactic position, so the learners' metalinguistic knowledge may not be influenced by cross-linguistic differences.

This prediction can also be supported by the grammar-oriented classroom instruction in China. Most, if not all, Chinese ESL learners acquire English through classroom-based instruction, and the distinction between finite and non-finite verbs, function and usage of non-finite verbs are described and explained in the national syllabus for junior high school English classes. The use of non-finite verbs is also one of test focuses of China's national middle-school exam, so it is likely that L2 learners will be familiar with these grammatical rules, and have a native-like judgment during the grammaticality judgment tests.

5.2.2 Experimental Design

5.2.2.1 Grammaticality Judgment

Grammaticality judgment (GJ) test data in the research design are used to make inferences about the syntactic structures and rules that constitute learners' linguistic competence (Mandell, 1999). The rationale behind using a grammaticality judgment test to check learners' metalinguistic knowledge is that "grammaticality judgments can

be used as evidence for making inferences about the cognitive systems that give rise to them, which syntacticians assume includes the grammatical system of the human language faculty (among other cognitive systems)" (Schütze & Sprouse, 2014, p. 3).

Among different kinds of grammaticality judgment tests, the untimed grammatical judgment test can reflect the subjects' explicit knowledge and only ungrammatical sentences can effectively expose their explicit knowledge (Marvin, 2013; R. Ellis, 2005). Therefore, ungrammatical sentences in an untimed grammaticality judgment grammaticality judgment test were used in the current experimental design. A Likert Scale was designed to assess the degree of grammaticality because this offers the advantage of being both numerical and intuitive. "The numerical means that Likert scale can be used to answer questions about the size of a difference between conditions by leveraging inferential statistical tests such as ANOVA and linear mixed-effects modeling" (Schütze & Sprouse, 2014, p. 8). Using a Likert scale, the participants read sentences and decide as quickly as possible whether they think that the sentence is acceptable or not, on a scale from 1 (least acceptable) to 6 (most acceptable) to show different degrees of acceptability. Judgments above the median (3.5) are regarded as "acceptable" while smaller than 3.5 as unacceptable.

The test sentences included grammatical violations in which over-inflected forms occupied the position of non-finite verbs in a sentence, similar to the misuses observed within the CLEC learners' corpus. Even though two misused forms, respectively bare verbs and over-inflection, were argued to be attributable to cross-linguistic differences, it is the over-inflection that reflects the morpho-syntactic transfer and the possible inability to distinguish [+-F]. If learners accept to a high degree the over-inflected

forms as object complement or adverbial, this suggests that the comprehension of [+-F] in these sentences is influenced by the learners' L1. On the contrary, if they judge these sentences to have low acceptability, this suggests that they have explicit knowledge of [+-F]. So, the ungrammatical sentences were those with over-inflected forms in the position of [-F] verbs. The test sentences (16 items) and fillers (16 items) were all chosen from the stimuli (48 items) and fillers (72 items) in online self-paced-reading tasks, which will be described in section 5.3. Considering the overall experiment duration, not all of the stimuli and fillers on the online tasks were chosen for the offline task. The 16 test sentences cover the sentences with [+F] as subject, direct object, object complement and adverbial, and each sentence type has 4 items. For example,

(23) a. Sentences with [+F] as subject: *Jane said that had a kind-hearted neighbor was very important.

b. Sentences with [+F] as direct object: *Brad aimed got the champion in the match.

c. Sentences with [+F] as object complement: *Charlie asked the waitress brought some tea..

d. Sentences with [+F] as adverbial: *It rained heavily last night caused a flood.

The present study is an exploratory investigation, and covers 32 items, half of which are test items in the four sentence types, i.e., [-F] as subject, object, object complement and adverbial (see Appendix 4). All of the items were randomized and tested among the 73 participants, including 25 English native speakers and 48 Chinese ESL learners.

5.2.2.2 Oxford Placement Test

To assess the participants' L2 proficiency, 50 items of the grammar test in the Oxford Placement test (OPT) was used as a task-independent measure of L2 proficiency. Each correct item is scored 1 point. Less than 30 points indicates a low-level English proficiency; 30-35 points a lower-intermediate level; 35-40 points a higher-intermediate level; and 40-50 a high level. The OPT test is attached as Appendix 3.

5.2.3 Procedure

The experiment (including the offline grammaticality judgment task and online self-paced-reading task) was carried out respectively at the China University of Petroleum (Qingdao, China) and the University of York (York, UK). Forty-eight first- and second-year undergraduates of different majors (age: 18-21) who learn English as the L2 in China, and a control group of 25 English native speakers who are first- and second-year undergraduates of different majors (age: 18-21) in the UK participated in the experiment. All of the participants took the test in their home country. The enrolment of the participants was through campus advertisements or email. Participants who were interested in the experiment volunteered to take part in it. All of the data were anonymized after coding.

All of the participants were allotted a time slot in advance, and engaged with the experiment one at a time in a quiet office. Prior to the experiment, the participants were required to read and sign the consent form (see Appendix 1), in which the purpose of the proposed study, the time, the procedure and reward for the experiment, the way in which the data would be used, the right to withdraw data, and the department's

contact details were all stated. Only those participants who gave their consent by signing the form proceeded to take part in the main experiment.

The participants firstly completed a self-paced reading task (around 40 minutes) on a laptop, followed by a grammaticality judgment test (around 20 minutes) on the paper. The Oxford Placement Test, as an independent proficiency test, was arranged after the experiment only for L2 learners (around 30 minutes). The reason for arranging the offline task after the online experiment was to avoid the latter influencing the former, as the latter is more implicit with regard to measurement and sensitive in response time. However, for the convenience of describing the results, the grammatical judgment task is described first.

Following the experiment and proficiency test, the participants were required to complete a self-information form to provide us with their background details and avoid any possible influential factors. The background questionnaire consists of 15 items, and provides information about the participants' name, sex, age, level of education, profession, country, native language, self-reported L2 proficiency level, age of starting learning Chinese, natural exposure to other languages, experience of living in other countries, daily usage of L1 and L2, self-reported preferences regarding learning new languages, and other remarks concerning languages. This questionnaire looked into both the general language background and individual differences in language learning, which provided useful details for explaining the experiment results.

Before the participants left, they received a reward for participating and signed the reward confirmation form.

5.2.4 Results

5.2.4.1 Participant Information

The seventy-three participants were divided into a control group (25 English native speakers) and a test group (48 Chinese ESL learners). The background information, collected via the questionnaire, is shown in Table 16 (see Appendix 2 for the questionnaire). As shown in Table 16, the members of the learner and native English groups were of a similar age (learners: M=19.13, range:18-21; natives: M=19.56, range:18-21). The learners had been learning English for over 10 years on average, via classroom instruction. Among the L2 learners, 45 participants had never visited an English-speaking country, while 3 had less than 3 months' traveling experience in English-speaking countries. Overall, the group was controlled for type and amount of exposure to English. Their self-assessment on English proficiency was, on average, 3.01/5 (range:0-5, 5=excellent).

In the proficiency test (Oxford Placement Test), the average score was 34.77 (SD=4.26), with the lowest score being 20 and the highest 43. The proficiency score was treated as a continuous variable in the results analysis. Figure 3 shows the distribution of the scores. The learners' proficiency scores were normally distributed.

Table 16 *Participants' Background Information in the English Experiments*

Background Information	Chinese ESL Learners	English Natives
Number	48	25
Age	Mean= 19.13 (range: 18-21)	Mean= 19.56 (range: 18-21)
Sex	Female=32; Male =16	Female =18; Male =7
Major	5 majors	4 majors
L2 Exposure age	Mean= 8.69 (range: 4-12)	N/A
Years of learning L2	Mean= 10.375 (range: 8-15)	N/A
English-speaking country living experience	No experience: 45 With experience: 3 (less than 6 months)	N/A
Self-report L2 Proficiency	Mean=3.01/5 (excellent) (SD=0.67)	N/A
Learning method	Classroom instruction (100%)	N/A
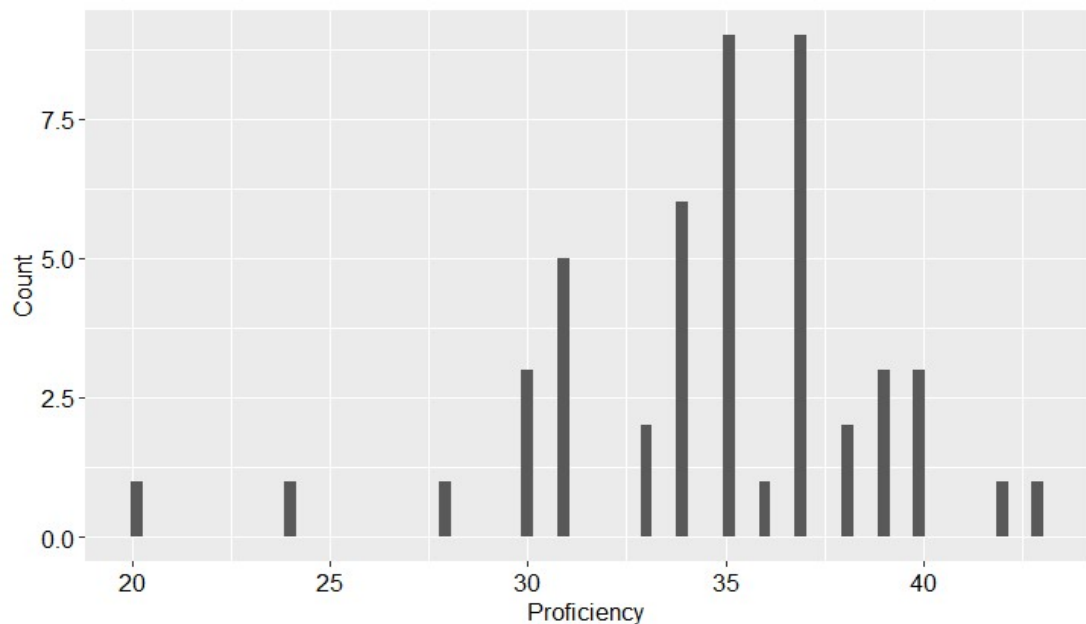
Figure 3. Proficiency distribution of Chinese ESL learners

5.2.4.2 Analysis of the Grammaticality Judgement Test

Grammaticality judgment data collected via a Likert-scale are usually regarded as ordinal data (Schütze & Sprouse, 2014), and parametric statistical tests, such as t-tests and ANOVAs are usually used for the analysis. The mean and standard deviation of the participants' judgments in the 4 sentence types are described in Table 17. Both the learners and natives' mean judgments are lower than 3.5 (range: 0-6, 3.5 is the median number. <3.5 means different degrees of unacceptable; >3.5 means different degrees of acceptable).

Table 17 *Description of the Results in English Grammaticality Judgment Test*

Group	[+F] as Subject Mean (SD)	[+F] as Object Mean (SD)	[+F] as Object Complement Mean (SD)	[+F] as Adverbial Mean (SD)
Learners	3.30 (1.91)	2.93 (1.82)	2.97 (1.75)	2.80 (1.64)
Natives	3.28 (.945)	2.44 (.74)	3.22 (1.01)	3.31 (.93)

Independent-sample t-tests found that, for finite verbs as subject, object, object complement and adverbial, the grammatical judgments of natives and learners did not differ significantly. In [+F] as subject, $t(71)=-.041$, $p=.97$, $>.05$, as object, $t(71)=-1.28$, $p=.20$, $>.05$, as object complement, $t(71)=.65$, $p=.52$, $>.05$, as adverbial, $t(71)=1.43$, $p=.16$, $>.05$ (see Table 18). These figures indicated that the Chinese ESL learners did not differ significantly from the English natives with their explicit knowledge of finite and non-finite distinctions in English MVCs. To obtain a clear view of the distribution of the judgments among the two groups, a box-and-whisker plot is depicted in Figure 4.
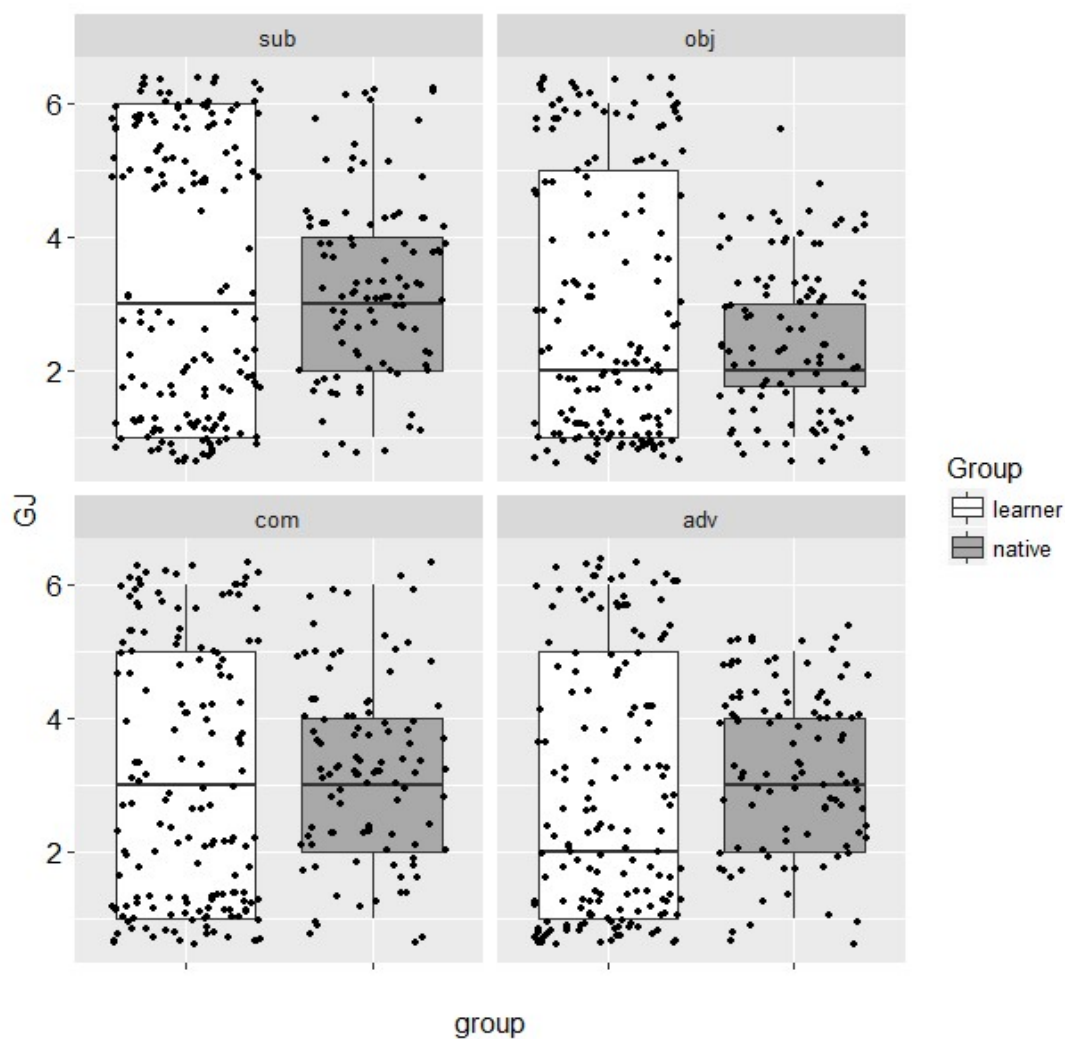
Figure 4. Distribution of grammatical judgments among the English natives and Chinese ESL learners. The bottom and top of the box are the first and third quartiles, and the band inside the box is the median. The ends of the whiskers represent the minimum and maximum of all of the data.

This box-and-whisker plot demonstrates a similarity of judgment between the four types of sentence. Even though the medians of the natives and learners' judgments did not differ significantly, the learners had a wider range of judgment. This thus raises the question of the role of L2 proficiency. Whether learners with different proficiency levels all have a wide range of judgments, or the judgments distributed in the higher acceptability zone were made only by low-proficiency learners, remains unclear.

The next step is to explore whether the grammaticality judgments have any relationship with the learners' proficiency and also whether the different syntactic structures make a difference. Correlation analysis shows that, in [+F] as subject, object and object complement sentences, the grammaticality judgement scores were significantly related to the scores for English proficiency ([+F] as subject: r=-.33, *p =.021, <.05, as object, r=-.38, *p=.01, <.05, and as object complement: r=-.30, *p=.036, <.05). In sentences with [+F] as the adverbial, the grammatical judgment scores were not significantly related to the level of English proficiency (r=-.26, p=.073, >.05), which suggests that the difference between the judgments of high and low proficiency learners was not statistically significant.

The data show that, apart from in the case of [+F] as adverbial, the higher the English proficiency, the lower the learners' acceptance to the inflected non-finite verbs (see Table 18).

Table 18 *Comparison and Correlation of Factors in English Grammaticality Judgment Test*

	[+F] as Subject	[+F] as Object	[+F] as Object Complement	[+F] as Adverbial
Natives	3.28 (.94)	2.44 (.74)	3.22 (1.01)	3.31(.93)
Learners	3.30 (1.91)	2.93 (1.82)	2.97 (1.75)	2.80 (1.64)
T-test	t=-.041, p=.97	t=-1.28, p=.20	t=.65, p=.52	t=1.43, p=.16
Correlation with proficiency	r=-.33, *p=.021	r=-.38, **p=.001	r=-.303, *p=.036	r=-.26, p=.073

5.2.5 Discussion

To answer the question of whether Chinese ESL learners possess the

metalinguistic knowledge of the [+-F] distinction in English, the grammatical judgment test was designed. It was hypothesized in terms of the production data that learners only have the metalinguistic knowledge in sentences with [-F] verbs as subject and object, because the production in [-F] as object complement and adverbial sentences implied morphological transfer. On the other hand, based on the previous finding that Chinese ESL learners performed better in comprehension than in production tasks and the grammar-instruction oriented teaching method, it was predicted that sentence type may not be an influential factor, and that learners can distinguish the [+-F] distinction in English MVCs.

The experimental results support the latter hypothesis, revealing that the judgment of ungrammatical non-finite verbs was related to L2 proficiency, and no sentential differences regarding the offline judgments were found. These results demonstrated that the cross-linguistic differences between Chinese and English did not appear to play an important role in the learners' grammaticality judgments, because Chinese learners had native-like judgment not only on the sentences which have similar finite and non-finite distinctions with their L1, but also on sentences where there are no counterparts in their L1.

The naturalistic corpus data and empirical grammaticality judgment data exposed the asymmetry of the cross-linguistic influences on L2 production and metalinguistic knowledge. Learners' metalinguistic knowledge in L2 was less affected by the L1 reminiscent sentence structures. L2 proficiency was the factor that influenced the explicit knowledge of the [+-F] distinction among Chinese ESL learners. The different cognitive demands and learners' L2 learning methods may explain the asymmetry of cross-linguistic influences on L2 production and

comprehension.

In comparison with the naturalistic production, the grammaticality judgment task does not require a heavy burden of high accuracy. With a higher demand for accuracy and familiarity of grammatical knowledge in production, learners may compose sentences with the help of the L1, intentionally or unintentionally. In the interlanguage, intentional morpho-syntactic transfer may occur for the purpose of communication. Unintentional transfer which relates to the unconscious use of L1 may also occur because the explicit knowledge in L2 may not be automatized, so it is more likely that L1 negative transfer will occur during production tasks. Metalinguistic knowledge, on the other hand, has a lower cognitive demand, and relates to the comprehension and memorization of grammatical rules. It was observed from various tasks that, in the case of non-finite verbs, Chinese ESL learners performed better on multiple choice tasks than on written production tasks (Liu, 2012; Shi et al., 2010; Yang, 2012), so researchers deduced that it is easier for Chinese ESL learners to comprehend English non-finite verbs than to produce them. Similar sentences in the L1 were found to facilitate L2 comprehension, such as listening and reading, in production, however, "L1-based forms and procedures are used in the absence of appropriate L2-based forms or procedures" (Ringbom, 1992, p. 1467).

Apart from the task features, the L2 method of instruction may also contribute to the asymmetry. As shown by the background questionnaire, all of the participants reported learning English through classroom instruction and the grammar was taught explicitly. "Explicit learning takes place consciously, either in the form of a search for underlying structure, or in the form of rule assimilation following explicit instruction" (Hulstijn, 2002, p. 196). Learners were instructed on the features of

English non-finite verbs, and the [+-F] distinction was required to be memorized. Learners were more likely to resort to textbooks or learned rules for judgment instead of to the L1. In contrast, production requires not only an explicit knowledge of the grammatical rules but also an implicit knowledge. The meaning that learners intend to convey may be unconsciously composed in the L1 and then translated into the L2. This process involves the L1 morpho-syntactic construction. In general, the grammaticality judgment test showed that metalinguistic knowledge was related to L2 proficiency and was less affected by cross-linguistic influence. The higher the L2 proficiency, the more explicit knowledge the learners had.

5.2.6 Limitations

This study has the limitation of only involving ungrammatical MVCs but no grammatical MVCs. Even though it was found that only ungrammatical sentences were related to the explicit knowledge (R. Ellis, 2005), without a comparison with grammatical sentences, it is not clear if Chinese ESL learners can distinguish the finite and nonfinite verbs in English MVCs and has the risk of learners' response bias. The results only revealed that Chinese learners showed native-like low acceptability to the over-inflected non-finite verbs, and this exposed their knowledge on the forms of non-finite verbs. For the future study, it is necessary to have both grammatical and ungrammatical MVCs as test sentences.

It also has the limitation that subject ratings appear bimodal in Chinese ESL learners' GJT task, and may not warrant a parametric analysis. A further check with non-parametric analysis may be needed.

5.3 Chinese ESL Learners' Online Processing of English MVCs

This section describes the self-paced reading experiment which was designed to investigate the online processing of morphological cues in English [+-F] distinction. The task can expose learners' real-time sensitivity to the L2 salient cues, and thus demonstrate their implicit knowledge. In sections 5.1 and 5.2, Chinese ESL learners' interlanguage and metalinguistic knowledge were introduced, and it was concluded that cross-linguistic differences had more impact on Chinese ESL learners' production than on their explicit knowledge. To investigate further if their implicit knowledge is influenced by cross-linguistic influence, an online self-paced reading task was carried out.

5.3.1 Research Questions and Hypothesis

The research question is:

Whether varied cross-linguistic differences in finiteness influence Chinese ESL learners' online processing of English MVCs and if L2 proficiency affects this.

Hypothesis a: Chinese-English learners are only sensitive to the morphological distinction of [+-F] in sentences with [-F] as subject and object, while not sensitive to that in sentences with [-F] as object complement and adverbial.

The production data in learners' interlanguage corpus showed that Chinese ESL learners applied syntactic transfer in the sentences with [-F] as object complement and adverbial because, in Chinese, multiple verbs can be in one temporal category in the reminiscent pivotal and serial-event sentences. The misuses of the L1 structures are likely to originate from the lack of implicit knowledge, which means that learners unintentionally compose sentences in the L1, and the L2 knowledge is not automatized.

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Moreover, in light of the production data, it is assumed that high-proficiency Chinese-English learners would have more native-like performance than low-proficiency ones, i.e., a more robust slowdown during SPR.

From the perspective of processing theories, the competition model explains the processing of a language as "how speakers integrate various types of information or cues in a sentence to determine sentence roles (e.g., who does what to whom)" (P. Li, 1998, p. 34). The salient morphological cue in English multiple verbs is competed with the cue from the reminiscent pivotal and serial-events sentence, in which V_2 can be suffixed with aspectual markers (see Li & Cheng, 2008; J. Lin, Huang, Zhang, & Xu, 2012; Paul, 2008; Xing, 2004), and thus learners' online processing may be influenced by the L1. In comparison, the aspectual markers in Chinese sentences with verbs as subject and object are consistent with the cue in English sentences with [-F] as the subject and object, so learners are predicted to be sensitive to the anomalies in these sentences.

Hypothesis b: Chinese-English learners are sensitive to the morphological distinction between the finite verb and non-finite verbs in all sentence types.

The grammaticality judgment data showed that Chinese ESL learners have explicit knowledge of the [+-F] distinction in the four types of English MVCs. The strong interface accounts argued that explicit knowledge can be converted into implicit knowledge and vice versa (e.g., DeKeyser, 1998), so learners may also have implicit knowledge of English finite and non-finite verbs distinctions in all MVCs sentences and, correspondingly, the cross-linguistic differences may have little influence on the implicit knowledge.

5.3.2 Experimental Design

5.3.2.1 Participants

The participants were the same as those who took part in the grammaticality judgment task.

5.3.2.2 Materials

In English, the way to distinguish finite and non-finite verbs is via inflectional tense marking. Only the finite verb can anchor its time, and non-finite verbs do not inflect with tense (e.g., *she encouraged me to go to school*). It is obligatory to have one tensed form in a single sentence. With another tensed form in a non-finite position (e.g., *she encouraged me went to school*), the morphological violation is predicted to result in a longer response time. It is therefore assumed that L2 learners' sensitivity to the tensed form implies their implicit knowledge of morphological cues. The self-paced-reading experiment was designed to test the learners' online sensitivity to the tensed forms in the syntactic position of [-F] in English MVCs.

The task was designed using E-prime software. In SPR, 48 stimuli with 72 fillers were created (see Appendix 5) and all of the experimental sentences were classified into 4 types, i.e., 12 items per type.

The 4 types were, respectively, non-finite verbs as subject, as object, as object complement and as adverbial. All of the experimental items comprised two sentences. The first was the critical sentence and it contained minimal pairs which are non-finite verbs (e.g., *to finish*) or tensed verbs (e.g., *finished*) (see 5.2.2.1 for the reason of not using bare verbs as minimal pairs). There were no minimal pairs at the beginning or end of the sentence in order to avoid a wrap-up effect (see 4.2.3.1 for the explanation

of a wrap-up effect). Following each item, there was a comprehension question. The reaction time of both the critical segment and the other segments was automatically recorded in milliseconds using E-prime software. Meanwhile, the accuracy of the comprehension questions was recorded to check whether the participants were reading for comprehension. Experimental sentences were pseudo-randomized by the computer following a Latin square design, and each experimental item (either grammatical or ungrammatical) only appeared once.

(24) For example:

Sg. 1	Sg. 2	Sg.3	Sg. 4	Sg. 5	Sg. 6	Sg.7
The boss	forced	the coach	to leave/ *left	the team	after the match.	The coach was very sad.

Question: Was the coach sad?

The words in the stimuli (see Appendix 5) were chosen from the Chinese Middle School Syllabus to ensure that the participants were familiar with the words and could comprehend the meaning of the sentences correctly. Ten English native speakers from the University of York and the University of Oxford were tested to measure whether or not the assumed grammatical and ungrammatical distinctions were accurate. The participants participated in this task alone (and none of the others) in their own country.

The sentence judgment task included 48 items which covered all of the stimuli used during the self-paced reading experiment. For each item, the participants saw two sentences. The first was either grammatical or ungrammatical, while the second was a simple single clause, as a completion of the first. The participants were asked to read the sentences and decide as quickly as possible, without thinking too much, whether

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they thought that it was acceptable or not, on a scale from 1 (least acceptable) to 6 (most acceptable). Table 19 describes the mean and *SD* of English native speakers' judgment.

Table 19 *English Native Speakers' Grammaticality Judgment of the Stimuli in SPR*

Sentences	Conditions	Mean	SD	T-test sig. (2 tailed)
[-F] as subject	grammatical	4.48	1.34	$t(5)=6.10$ $p=.002, <.05$
	ungrammatical	1.88	.45	
[-F] as object	grammatical	3.74	1.16	$t(5)=3.96$ $p=.011, <.05$
	ungrammatical	1.67	.364	
[-F] as object complement	grammatical	5.13	.82	$t(5)=13.04$ $p=.00, <.05$
	ungrammatical	2.07	.49	
[-F] as adverbial	grammatical	4.39	1.33	$t(5)=4.59$ $p=.01, <.05$
	ungrammatical	2.27	.79	

Paired samples t-test showed that, in all conditions, the English native speakers' ratings of the grammatical and ungrammatical sentences differed significantly (see Table 19), so the stimuli in SPR were appropriate for testing the participants' sensitivity to the ungrammaticality.

5.3.2.3 Pilot Study

Twelve fourth-year undergraduate and first-year postgraduate English majors (mean age: 22.1; 21-25) from the China University of Petroleum (Eastern China) and 20 middle school students of grade nine and above (mean age: 15.5; 13-18) from No.1 Shengli Oilfield Middle School in Shandong Province participated in the pilot study, together with a control group of 7 native (British) English speakers (mean age: 23.3;

18-42).

The participants were tested in a quiet room and were asked to fill in the consent form first. They then sat down in front of a 13.3-inch laptop computer, approximately 600mm from the screen. The experiment began with a red cross "+" as the fixation point, reminding the participants that the experiment was about to begin. Then, the participants read the texts by pressing the space key so that segments of the text were displayed on the computer screen. Each key press caused a new part of the text to appear and the previous portion to be removed. Each experimental item consisted of two sentences. All of the stimuli and half of the fillers were followed by a yes/no comprehension question, requiring an equal number of "yes" and "no" responses (e.g., *She said that living/lived in a quiet place was very important. She lives in such a place. Does she live in a quiet place*?). The participants were asked to judge whether the answer was "yes" or "no", based on what they had read. If their response was "yes", they pressed "F" on the keyboard and, if no, they pressed "J". There was a notice on which "F: Yes" and "J: No" were clearly printed, placed next to the computer. The comprehension questions were included in the experiment to ensure that the participants were paying attention, and the questions were not targeted at the experimental manipulation itself. The participants could practice using several sentences until they were ready, at which point they pressed the space key to begin the formal experiment. The reading times were only analyzed with regard to those items to which the participants responded correctly. The response time for each segment was recorded using E-Prime 2.0.

The SPR results of 11 undergraduate and postgraduate English majors were chosen from the 12 samples as the high proficiency group, with one participant being

removed because of low accuracy (lower than 50%), to answer the comprehension questions, while 12 middle school students were selected from the 20 samples as the low-proficiency group, with 8 participants being removed due to low scores (18-24/50) on the proficiency test. All 7 native English speakers were chosen. Table 20 lists the participants' response times (RTs) for ungrammatical minus grammatical segments in the critical segment (Sg. V0), and the following two segments (Sg. V0+1 and Sg. V0+2).

Table 20 *Ungrammatical RTs Minus Grammatical RTs in Segment v0, v0+1, and v0+2 in the Pilot Study of English Learning Direction*

Sentences	Participants	Sg. V0	Sg. V0+1	Sg. V0+2
[-F] as subject	Native	127	102	107
	High-proficiency	158	155	23
	Low-proficiency	185	216	141
[-F] as object	Native	29	60	44
	High-proficiency	117	59	90
	Low-proficiency	-1	93	150
[-F] as object complement	Native	69	185	205
	High-proficiency	131	591	84
	Low-proficiency	0	-182	155
[-F] as adverbial	Native	-36	56	-104
	High-proficiency	65	77	28
	Low-proficiency	6	-202	-359

It was found that low-proficiency Chinese ESL learners did not experience a robust slowing-down in the ungrammatical v0+1 segment, as did the English native

speakers in the sentences with [-F] as the object complement or adverbial. The high-proficiency learners showed sensitivity to the violation of non-finite forms in all sentence positions. The pilot study showed that the SPR experiment was effective and did expose any processing differences between native speakers and L2 learners, which was of great value to our main study. However, there were several limitations associated with the pilot study, i.e. the ages of the participants (Chinese ESL learners) were not controlled, as the low-proficiency learners were younger than the high-proficiency ones, on average, which may relate to the cognitive factors in processing; fewer than 2 segments after the critical segments caused inaccuracy in interpreting the spill-over effects (a spill-over effect refers to the secondary effect after the effect that occurs in the critical segment); and copula verbs instead of notional verbs were used as the predicate verb in sentences with [-F] as the subject, which may affect the participants' judgment of the relationships among multiple verbs.

To modify these limitations, the ages of participants were well controlled in the main study: all of the participants were aged 18 to 22 (undergraduate students). Further segments were added after the critical segment to demonstrate the spill-over effects, and the copula verb in the non-finite verbs as subject sentences was changed to notional verbs. The following examples illustrate the modification of the stimuli.

(25) Type I. Sentences with [-F] as the subject

a. Stimuli in the pilot study:

Sg. 1	Sg. 2	Sg.3	Sg. 4	Sg. 5	Sg. 6	Sg. 7
She said	that	living/ *lived	in a quiet place	**was**	very important.	She lives in such a place.

b. Stimuli in the main study:

Sg. 1	Sg. 2	Sg.3	Sg. 4		Sg. 5	Sg. 6	Sg. 7
She said	that	working/ *worked	in night	late	**harmed**	her health.	She always works late.

Question: Does she often work early?

Type II. Sentences with [-F] as the object

a. Stimuli in the pilot study:

Sg. 1	Sg. 2	Sg.3	Sg. 4			Sg. 5	Sg. 6
Joy	intended	to finish/ *finished	his homework			in the morning.	The homework was very easy.

b. Stimuli in the main study:

Sg. 1	Sg. 2	Sg.3	Sg. 4		Sg. 5		Sg. 6
Joy	intended	to finish/ *finished	his homework		in morning.	the	He found it very easy.

Question: Did Joy think the homework difficult?

Type III. Sentences with [-F] as the object complement

a. Stimuli in the pilot study:

Sg. 1	Sg. 2	Sg.3	Sg. 4		Sg. 5	Sg. 6
The boss	forced	the coach	to	leave/ *left	the team.	The coach was very sad.

b. Stimuli in the main study:

Sg. 1	Sg. 2	Sg.3	Sg. 4	Sg. 5	Sg. 6	Sg.7
The boss	forced	the coach	to leave/ *left	the team	**after the match.**	The coach was very sad.

Question: Was the coach sad?

Type IV. Sentences with [-F] as the adverbial

a. Stimuli in the pilot study:

Sg. 1	Sg. 2	Sg.3	Sg. 4	Sg. 5	Sg. 6
It	rained heavily	last night	causing/ *caused	a flood.	The flood was very severe.

b. Stimuli in the main study:

Sg. 1	Sg. 2	Sg.3	Sg. 4	Sg. 5	Sg. 6	Sg.7
It	rained	in the night	causing/ *caused	a flood	**in the downtown.**	The flood was very severe.

Question: Did the flood happen in the downtown?

5.3.2.4 The Main Study

The main study was carried out at China University of Petroleum (Eastern China) with 48 first- and second-year undergraduates of different majors (age: 19-21) as the L2 learners' group and also at the University of York (UK) with 25 first- and second-year undergraduates of different majors (age: 18-20) as the natives' group. The procedure was the same as that for the pilot study. The participants signed the consent form, read the instructions about the SPR experiment, practiced several items until

they were ready, began the online test, then completed the grammatical judgment test, and Oxford Placement Test, and finally filled in the background questionnaire and received their reward. The online task took the L2 learners approximately 40 minutes and the English native speakers 20-25 minutes.

5.3.3 Results

Before the SPR data screening or analysis, items with incorrect answers to the comprehension questions were removed to minimize the extended response time due to improper comprehension or lack of attention. As the participants had individual differences regarding their general reading time, and were sampled from a broad range of the L2 proficiency spectrum, their RTs might be greatly influenced and fluctuate because of these variables. Within the same segment, the word-length of different sentence items differed (e.g., to live=7, to study=8) so a modified version of the length-adjustment procedure, as proposed by Ferreira Clifton (1986), was used to adjust the length of the raw RT data in order to statistically control the variability in RTs associated with length and overall reading speed on a participant-by-participant basis. This was calculated as follows.

A linear regression was used to calculate the anticipated RTs per subject on the basis of all of their reading times of all segments (including fillers but not the practice or questions). Any excessively high or low RTs associated with either an experimental or filler item with an RT greater than 5,000 ms or less than 100 ms was excluded. These screening criteria led to the removal of less than 1.87% of the overall number of data points. A linear regression per subject was then computed using SPSS to obtain the expected speed per subject, depending on how long the word/segment was for a particular person, e.g., $y = 72.09x + 249.14$, (y: expected response time; x: word length).

In this way, the RT for each word in every item (both experimental and filler items) was predicted using a regression model that contained a fixed effect for word length, a random intercept for the subject, and a random slope for length. By using model-predicted values subtracted from the raw RTs, the length-adjusted residual RTs were calculated, serving as the dependent variable for all of the RT analyses reported subsequently (Fine, Jaeger, Farmer & Qian, 2013).

The residual RTs in the critical segment (v0), the immediately following segment (v0+1), and the second segment after the critical segment (v0+2) were all extracted from the raw RTs, so that the spill-over effect could be checked. Online processing is an incremental process, and readers may display a robust slowing down in the following segments, so the RTs following the critical segments are also important in reflecting the processing difficulties (e.g., Roberts & Liszka, 2013). The natives and learners' RTs in v0, v0+1, v0+2 in four types of sentences, under both grammatical and ungrammatical conditions, are displayed in Table 21.

To obtain a clear view of the processing pattern, the mean RTs in the segments of v0, v0+1, and v0+2, in both grammatical and ungrammatical sentences, are shown in Figure 5. The mean RTs show that the learners and natives all had a longer processing time with regard to the ungrammatical critical segment (v0), but the responses in the following segments were different, as the natives kept slowing down while the learners did not show a robust spill-over effect in certain sentences, such as in pivotal sentences.

Table 21 *Description of the RTs in processing English MVCs*

Type	Group	Grammar	Rts in Sg. V0 mean(SD)	Rts in Sg. V0+1 mean(SD)	Rts in Sg. V0+2 mean(SD)
[-F] as subject	Natives	Ungrammatical	293.90 (385.34)	198.38 (514.51)	208.27 (358.81)
		Grammatical	142.44 (402.20)	75.77 (467.22)	219.75 (514.79)
	Learners	Ungrammatical	303.51 (828.77)	99.62 (1117.74)	141.18 (559.66)
		Grammatical	137.68 (637.21)	24.32 (793.82)	156.82 (597.75)
[-F] as object	Natives	Ungrammatical	148.63 (349.89)	1.39 (333.00)	-167.86 (383.54)
		Grammatical	-70.68 (172.96)	-101.56 (510.64)	-33.57 (527.52)
	Learners	Ungrammatical	249.05 (557.07)	-47.59 (553.73)	-229.26 (737.57)
		Grammatical	96.71 (543.04)	-31.71 (640.48)	-173.06 (742.41)
[-F] as Object complement	Natives	Ungrammatical	288.69 (380.31)	104.61 (403.32)	294.87 (699.49)
		Grammatical	27.25 (215.98)	26.34 (354.82)	238.89 (716.89)
	Learners	Ungrammatical	140.96 (552.43)	24.98 (615.13)	-86.80 (686.10)
		Grammatical	73.93 (614.78)	42.49 (596.46)	-54.39 (790.36)
[-F] as adverbial	Natives	Ungrammatical	136.89 (289.40)	-62.73 (232.30)	-31.76 (523.26)
		Grammatical	13.53 (228.63)	-83.45 (246.78)	-35.99 (530.98)
	Learners	Ungrammatical	107.53 (493.23)	-60.44 (438.27)	-158.32 (699.40)
		Grammatical	-35.09 (368.26)	-111.01 (444.92)	-207.30 (504.51)
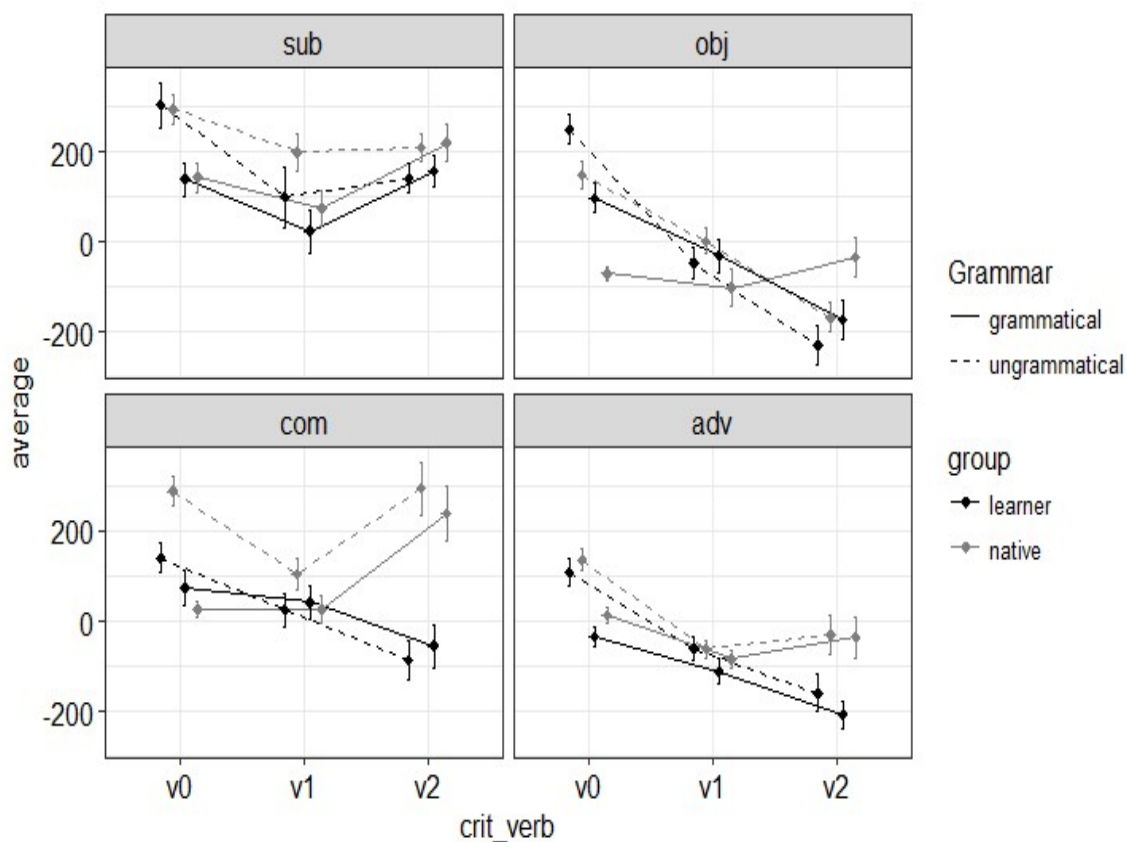
Figure 5. English natives and Chinese ESL learners' mean RTs in segment v0, v0+1, v0+2 in [-F] as subject, object, object complement and adverbial sentences. The error bars represent the standard error (n=25 in the native group, n=48 in the learner group)

To test the differences among the groups (natives vs. learners) statistically based on the RTs under both conditions (grammatical vs. ungrammatical) in the four types of sentence ([-F] as subject, object, object complement and adverbial), linear mixed-effects models were used for the data analysis. Linear mixed models offer several advantages compared with traditional analysis, even though the grand mean has been commonly used in the field of psycholinguistics to test the effect of variables

statistically.

With the method of grand mean, researchers average the items per subject (each data point comes from one subject, assuring independence) and average subjects for item analysis (each data point comes from one item), which to some extent disregards other variations when performing an analysis. "The upshot is: while traditional analyses that do averaging are in principle legit, mixed models give you much more flexibility and they take the full data into account. Mixed models account for both sources of variation in a single model" (Winter, 2013, p. 4).

The lme4 package (Bates, Mächler & Bolker, 2012) was implemented in the R environment (R Core Team, 2014). In all of the models reported subsequently, a random intercept for both the participants and the items were used. "Any t value with an absolute value exceeding 1.96 was considered statistically significant at an alpha level of p < .05" (Leal, Slabakova & Farmer, 2016, p. 17).

In sentences with [-F] as subject, the residual RTs in the critical segment (v0) was modeled with fixed factors of grammaticality (grammatical vs. ungrammatical) and group (natives vs. learners), with random factors of items and participants (formula: lmer (resi_rts~ grammaticality*group + (1| participant) + (1 | item)). The results showed that the participants processed grammatical critical segments (e.g., living) significantly faster than ungrammatical segments (e.g. lived) (β=-162.16, *SE*=56.03, *t*=-2.89, **p*<.05); there was no significant differences with regard to the groups (English native speakers and Chinese ESL learners) (β=-6.80, *SE* =77.60, *t*=-0.09, *p*>.05) and no significant effect of the interaction between group and grammaticality (β=10.93, *SE*=88.47, *t*=0.12, *p*>.05), which indicates that Chinese ESL learners and English natives did not differ significantly in terms of sensitivity to the tensed forms

as subject. To further explore if there were "spill-over" effect, we also modelled the RTs in the segment immediately following the critical segment (v0+1), and the second segment after the critical segment (v0+2). Similarly, no interaction between grammaticality and group was found (in v0+1: β=-48.46, SE=117.97, t=-0.41, p>.05; in v0+2: β=-4.07, SE=75.55, t=-0.05, p>.05), thus Chinese learners also processed the later segments native-like. See Table 12 for the mixed model analysis of RTs in critical and later segments.

Table 22 *The Mixed Model Analysis of RTs in Processing English Sentences with [-F] as Subject*

RTs	Factors	Estimate	*SE*	*t* value
In Sg. V0	Grammaticality (grammatical)	-162.16	56.03	-2.89*
	Group (native)	-6.80	77.60	-0.09
	Grammaticality (grammatical)* group (native)	10.93	88.47	0.12
In Sg. V0+1	Grammaticality (grammatical)	-72.63	79.21	-0.92
	Group (native)	100.45	92.37	1.09
	Grammaticality (grammatical)* group (native)	-48.60	117.97	-0.41
In Sg. V0+2	Grammaticality (grammatical)	17.11	56.77	0.30
	Group (native)	66.10	59.50	1.11
	Grammaticality (grammatical)* group (native)	-4.07	75.55	-0.05

In sentences with [-F] as object, RTs in the processing of grammatical and ungrammatical v0 were significantly different (β=-155.23, SE=42.42, t=-3.66, *p<.05); there was no significant group difference (β=-100.35, SE=57.44, t=-1.75, p>.05); and

no significant effect of the interaction was found either (β=-64.70, *SE*=65.64, *t*=-0.99, *p*>.05). In the later segments, there was also no significant interaction between grammaticality and group (in v0+1: β=-117.45, *SE*=77.28, *t*=-1.52, *p*>.05; in v0+2: β=79.37, *SE*= 92.93, *t*=0.85, *p*>.05) (see Table 23). So the L2 learners and natives didn't show significant differences in the processing of over-inflected or correct forms as sentence object.

Table 23 *The Mixed Model Analysis of RTs in Processing English Sentences with [-F] as Object*

RTs	Factors	Estimate	*SE*	*t* value
In Sg. V0	Grammaticality (grammatical)	-155.23	42.42	-3.66*
	Group (native)	-100.35	57.44	-1.75
	Grammaticality (grammatical)* group (native)	-64.70	65.64	-0.99
In Sg. V0+1	Grammaticality (grammatical)	13.68	52.96	0.26
	Group (native)	49.16	61.40	0.80
	Grammaticality (grammatical)* group (native)	-117.45	77.28	-1.52
In Sg. V0+2	Grammaticality (grammatical)	54.61	54.57	1.00
	Group (native)	63.89	75.38	0.85
	Grammaticality (grammatical)* group (native)	79.37	92.93	0.85

In sentences with [-F] as object complement, there was no significant differences between the RTs with regard to the processing of grammatical and ungrammatical critical segment (v0) (β=-66.46, *SE*=48.24, *t*=-1.38, *p*>.05). A significant group effect was elicited (β=147.64, *SE*=57.28, *t*=2.58, **p*<.05). And different from other sentence

types, a significant interaction between the group and grammaticality was found (β=-194.70, *SE*=72.61, *t*=-2.68, *p<.05), which showed that Chinese learners and English natives exhibited significant differences with regard to sensitivity to the tensed form as the object complement. No interaction between the group and grammaticality was found in segment v0+1 (β=-96.62, *SE*=78.01, *t*=-1.24, *p*>.05), nor in segment v0+2 (β= -91.97, *SE*=98.60, *t*=-0.93, *p*>.05) (see Table 24). This suggests that in segment v0+1 and v0+2, Chinese learners and English natives performed similarly.

Table 24 *The Mixed Model Analysis of RTs in Processing English Sentences with [-F] as Object Complement*

RTs	Factors	Estimate	*SE*	*t* value
In Sg. V0	Grammaticality (grammatical)	-66.46	48.24	-1.38
	Group (native)	147.64	57.28	2.58*
	Grammaticality (grammatical)* group (native)	-194.70	72.61	-2.68*
In Sg. V0+1	Grammaticality (grammatical)	17.99	45.99	0.39
	Group (native)	80.08	58.83	1.36
	Grammaticality (grammatical)* group (native)	-96.62	78.01	-1.24
In Sg. V0+2	Grammaticality (grammatical)	33.01	64.56	0.51
	Group (native)	382.86	98.92	3.87*
	Grammaticality (grammatical)* group (native)	-91.97	98.60	-0.93

Finally, in sentences with [-F] as the adverbial, there was a significant effect of grammaticality (β=-142.20, *SE*=33.02, *t*=-4.31, *p<.05) which means that the processing of ungrammatical segments cost significantly longer reading time. No

significant effect was found with groups (β=28.63, *SE*=41.77, *t*=0.69, *p*>.05). And no significant interaction between grammaticality and group was noticed (β=19.10, *SE*=56.37, *t*=0.34, *p*>.05), which indicates no significant differences between the L2 learners and natives in the processing of non-finite verbs as adverbial. In the subsequent segments, Chinese learners and English natives also have similar processing pattern (grammaticality* group in v0+1, β=27.38, *SE*=56.66, *t*=0.48, *p*>.05; in v0+2, β=46.16, *SE*=83.31, *t*=0.55, *p*>.05). See Table 25 for the detailed data in the mixed model analysis.

Table 25 *The Mixed Model Analysis of RTs in Processing English Sentences with [-F] as adverbial*

RTs	Factors	Estimate	*SE*	*t* value
	Grammaticality(grammatical)	-142.20	33.02	-4.31*
In Sg. V0	Group (native)	28.63	41.77	0.69
	Grammaticality (grammatical)* group (native)	19.10	56.37	0.34
	Grammaticality (grammatical)	-50.50	33.19	-1.52
In Sg. V0+1	Group (native)	0.30	40.66	0.01
	Grammaticality (grammatical)* group (native)	27.38	56.66	0.48
	Grammaticality (grammatical)	-49.68	53.40	-0.93
In Sg. V0+2	Group (native)	129.39	70.31	1.84
	Grammaticality (grammatical * group (native)	46.16	83.31	0.55

In general, Chinese learners and English natives did not behave significantly different in the processing of non-finite verbs as subject, object or adverbial; however,

they did show a different degree of sensitivity to tensed verbs as object complement.

The next step was to probe to the role of L2 proficiency, so the residual RTs were then modeled as a function of the fixed effects of grammar (grammatical vs. ungrammatical) and proficiency (the continuous variable), with the random effects of participants and items. In segment v0, v0+1, v0+2, no significant interaction between proficiency and grammatical forms was elicited in sentences with [-F] as the subject (β=-4.48, SE=9.03, t=-0.50, p>.05), which suggests that L2 proficiency was not an influential factor when processing these sentences. There was no significant interaction between grammar and proficiency in sentences with [-F] as the object either (β=-8.16, SE=7.48, t=-1.09, p>.05). A marginally significant effect on the interaction between proficiency and ungrammatical forms was elicited in sentences with [-F] as the object complement (β=-13.36, SE=7.52, t=-1.78, p>.05), and no significant interaction between proficiency and grammaticality in sentences with [-F] as the adverbial was found (β=0.81, SE=6.04, t=0.13, p>.05). These data show that the Chinese ESL learners' L2 proficiency may have played an important role in their sensitivity to the morphological cues in English sentences with [-F] as the object complement, but not in the other MVC sentences.

L2 proficiency was found to have a marginally significant effect on the interaction with the grammar in sentences with [-F] as the object complement, so the learners were further divided into two groups according to their performance in the Oxford Placement Test: 20 high-proficiency learners (score>35) and 20 low-proficiency learners (score<35). A comparison between the high and the low-proficiency learners revealed that the two groups significantly differed in their sensitivity to the tensed object complement (β=-139.47, SE=68.92, t=2.02, *p<.05)

(see Table 26, 27 for the data on the high- and low-proficiency learners). These data showed that proficiency made a difference: the high-proficiency learners behaved more native-like while, in contrast, the low-proficiency learners were not sensitive to the violation of the object complement, which indicated the L1 influence.

In general, the results showed that the Chinese ESL learners were sensitive to the tensed verbs as subject, object and adverbial which were native-like, but that they, and particularly the low-proficiency learners, presented a different processing pattern from English native speakers in the sentences with tensed verbs as object complement.

Table 26 *Description of High- and Low- Proficiency Learners' RTs in Sentences with [-F] as Object Complement*

Learners' group	Grammaticality	Rts in V0 *M (SD)*	Rts in V0+1 *M (SD)*	Rts in V0+2 *M (SD)*
High-proficiency learners	Ungrammatical	89.97 (539.90)	84.42 (651.68)	-11.51 (680.98)
	Grammatical	34.25 (652.84)	-10.28 (494.71)	-76.21 (595.44)
Low-proficiency learners	Ungrammatical	173.20 (577.20)	-60.70 (505.18)	-151.97 (697.87)
	Grammatical	94.38 (546.68)	84.61 (680.77)	-13.49 (986.13)

Table 27 *The Mixed Model Analysis of High- and Low- Proficiency Learners' RTs in Sentences with [-F] as Object Complement*

	Fixed variables	Estimate	*SE*	*t* value	*p* value
High-prof learners vs. low-prof learners	Grammaticality (grammatical)	-69.99	47.58	-1.47	*p*>.05
	Group (high-prof)	-69.51	77.28	-0.90	*p*>.05
	Grammaticality (grammatical)*group(high-prof)	139.47	68.92	2.02	*p*<.05

5.3.4 Discussion

The self-paced-reading experiment was designed to explore whether the Chinese-English learners were sensitive to the grammatical violation of non-finite verbs and also whether or not cross-linguistic differences and L2 proficiency affected the L2 learners' online processing. It was hypothesized, in light of the production data and competition model, that the Chinese ESL learners were only sensitive to the tensed forms as subject and object, but not to the tensed object complement and adverbial. On the other hand, it was predicted, based on the grammaticality judgment data and strong interface account that the learners were better at comprehending the non-finite verbs than producing them, and were sensitive to the tensed forms in all sentence types.

The results show that, in sentences with tensed verbs as subject and object and adverbial sentences, the learners were sensitive to the morphological cue in distinguishing the multiple verbs, which was native-like. L2 proficiency was not found to have a significant influence on the online sensitivity to the ungrammaticality of non-finite verbs. However, in sentences with tensed verbs as the object complement, the natives and learners displayed significant differences. L2 proficiency played an important role in sensitivity; namely, the high-proficiency learners processed the items in a more native-like manner while the low-proficiency learners were not sensitive to violations of non-finite forms. The participants' age, exposure to L2, study method, learning duration, starting age of learning L2, and other possible variables were carefully controlled, so the findings are assumed to reflect cross-linguistic influence, and the different processing patterns in sentences with a tensed object complement and adverbial are assumed to be caused by the different degrees of salience of the cues from the L1 reminiscent sentences, which means that the aspectual marker in pivotal

sentences poses stronger competition to the processing of [-F] as object complement than do the serial-event sentences to [-F] as adverbial.

5.3.4.1 Cross-linguistic Influence and L2 Proficiency

The real-time processing experiment showed that, in processing tensed verbs as subject or object, the learners and natives did not differ significantly. This indicates that learners had implicit knowledge regarding the use of morphological cues to distinguish the finite verbs from non-finite verbs. This verified the hypothesis that Chinese ESL learners were sensitive to the morphological cues in sentences with the [-F] as subject or object because of the congruency of cues in distinguishing finite and non-finite verbs in the L1 and the L2. Verbs as subject or object are non-finite in both English and Chinese. According to the definition of finiteness proposed by Klein (1998, 2000, 2006), finite verbs have both assertion and topic time, and the topic time in Chinese is reflected on aspect, while in English it is tense. The grammatical rule whereby non-finite verbs have no topic time is congruent in English and Chinese sentences with verbal-subject or verbal-object. The congruency of the morpho-syntactic features between the L1 and L2 may facilitate L2 processing (e.g., Roberts & Liszka, 2013), so the Chinese ESL learners were sensitive to the over-inflected non-finite verbs, and L2 proficiency did not play an important role.

On the other hand, the difference between the learners and natives' processing of over-inflected verbs as the object complement confirmed the prediction that, influenced by the competing cues in the L1, the learners were not sensitive to the over-inflected forms as the object complement. This is a meaning mapping problem. In English sentences with [-F] as the object complement, the salient cue is the tense marker (inflecting with gramamtical tense vs. not inflecting with tense), and it is

embodied in the past tense as the finite verbs (V$_1$) in the form of verb + *ed*, and the non-finite verb (V$_2$) in the form of *to* infinitives. However, in the reminiscent Chinese pivotal sentences, the perfective marker "*le*" can be suffixed to the V$_2$ (Li & Cheng, 2008, Xing, 2004). This indicates the completion of the event continuum composed by V$_1$ and V$_2$ and also means that both V$_1$ and V$_2$ are finite. Thus, the cues in the L1 and L2 are incongruent and competing. Influenced by the L1, Chinese learners displayed insensitivity to the over-inflected verbs as the object complement and also lacked implicit knowledge regarding the finite and non-finite verbs' distinction in these sentences. In these sentences, L2 proficiency played an important role and interacted with sensitivity. The high-proficiency learners processed the items in a more native-like way than the low-proficiency learners which suggests that the former were less influenced by cross-linguistic differences and can be native-like in their automatic processing. In comparison, the low-proficiency learners displayed a lack of implicit knowledge regarding the finite and non-finite distinctions in sentences with [-F] as object complement due to cross-linguistic influences.

Finally, the finding that the learners' processing of over-inflected verbs as the adverbial did not differ significantly from that of the English native speakers is arguably due to the reduced salience of the cues in the L1. Chinese serial-event sentences have more than one interpretation within the same sentence, as verb 2 can be understood either as the purpose of V$_1$ or the serial event of V$_1$ (e.g. *ta maipiao kan dianying,* "he buy tickets watch the movie", he bought the tickets to watch the movie/ he bought the tickets and watched the movie). This means that, within the same sentence, V$_2$ can be interpreted as the adverbial for purpose without the specific temporal information or the consecutive event with the same temporal information of V$_1$. Aspectual markers are not compulsory in serial-event sentences that occur in the

past, and so may not be salient in distinguishing the functions of multiple verbs.

To explain further why pivotal sentences and serial-event sentences appear to have a different impact on Chinese ESL learners' online processing of non-finite verbs, these two kinds of Chinese sentences should be scrutinized. In pivotal sentences, V_1 as the causative verb, together with V_2, compose a frame (Xing, 2004), and "*le*" appears after the frame. Xing (2004) has examined pivotal constructions in the verb usage dictionary (Meng, Zheng, Meng, & Cai, 1999) and found that, of the 1,328 verbs contained therein 180 (13.55%) can be used as V1 in pivotal constructions. In the pivotal sentences containing these 180 verbs, almost all the particles appear after V_2 rather than V_1. For example, in a one-verb sentence "*tā mìnglìngle wǒ*." (he order le me), "*le*" can be added after "*mìnglìng*" (order) to indicate the completeness, however, if we use "*mìnglìng*" (order) as the V_1 in pivotal sentences, it is uncommon to say a sentence "**tā mìnglìngle wǒ dǎkāi mén*" (he order le me open the door). So "*le*" is suffixed after V_2 to indicate the completeness of the event continuum ("*tā mìnglìng wǒ dǎkāile mén*" (he order me open le the door)). Thus, in pivotal sentences, the position of "*le*" is realiable and salient.

In contrast, the position of "*le*" is more flexible in serial-events sentences. Paul (2008) mentioned that the position of "*le*" can be either after V_1 to indicate that V_2 is the purpose of V_1 (e.g., "*tā mǎile piào jìn jùyuàn*" (she buy le ticket enter theatre)) or after "V_2" to show the completeness of the whole event continuum (e.g.,"*tā mǎipiào jìn le jùyuàn*." (she buy ticket enter theatre)). In the latter sentence, both V_1 and V_2 have occurred, and both are finite. In light of the reliance of the position of aspectual markers, pivotal sentence and serial-event sentences differ, as do their impacts on online processing. Our explanation is that the position of the aspectual marker "*le*" is more salient and reliable in interpreting the relations between multiple verbs in Chinese

pivotal sentences than in serial event sentences, so it has a more competitive effect on L2 learners' automatic processing. It is possibly the competing cue in L1 that led to the L2 learners' different processing patterns in sentences with tensed forms as the object complement. This finding shows learners' inclination to process sentences as they would in their L1. The aspectual marker in serial-event sentences, which has a low level of reliance and is less salient, was not found to affect significantly learners' online processing of English salient cues in sentences with [-F] as the adverbial. Additionally, L2 proficiency did not have significant interaction with the grammaticality of the sentence, suggesting that both the high- and low-proficiency learners possessed implicit knowledge about the finite and non-finite distinctions in English sentences with [-F] as the adverbial.

In sum, the SPR results indicate that the cross-linguistic differences indeed influenced the L2 learners' processing of English non-finite verbs. This finding supports the competition model which proposes that L2 processing is an interaction of salient cues. This was shown as: when the cue in L1 is congruent with that in L2 (e.g., English [-F] as the subject or object vs. Chinese verbs as the subject or object), L2 learners performed native-like; when the cues in the L1 and the L2 compete with each other (e.g., English [-F] as object complement vs. Chinese pivotal sentences), L1 transfer occurred and learners showed automatic inattention to the L2 salient cue; when the cue in L1 is not salient enough, it did not affect learners' processing of the L2 salient cue.

This finding can add to the literature in investigating how multiple cues are chosen in L2 processing. Most of the previous studies focused on the grammatical property that is salient in L2 but not salient or absent in L1, such as tense, articles, plurals,

subject-object agreement. It was found that learners from tenseless, non-inflectional language background (e.g., Chinese) had difficulties in using some grammatical cues such as articles, past-tense markers, plurals, subject-object agreement in L2 (e.g., Luk & Shirai, 2009; Hawkins & Liszka, 2003; Lardiere, 1998a, 1998b, 2000; Jiang, 2004), because they are overshadowed by lexical and pragmatic cues from L1. Other studies have explored the processability problem of learners from a language background without such cues in L2 processing and found different results. For example, it was found that intermediate to high proficiency Chinese ESL learners can use the morphosyntactic cue (articles: the, a) in reference resolution in English in real-time (Trenkic, Mirkovic & Altmann, 2014). In another study supporting the processablity of English morpho-syntactic cues by learners with Chinese as L1, it was found that in the nearly congruent morphology—the progressive, which is grammaticalized and morphologically marked in both Chinese and English, even low proficiency learners could automatically process it; in the past tense, even though it is not grammaticalized in Chinese, morphemes "*le*" and "*guo*" can express similar "past" meaning, and only high proficiency learners could automatically process it; in the present third person singular, which is not marked at all in Chinese, only in eye-tracking experiment which has a lower processing load compared to the self-paced reading paradigm, high-proficiency learners showed their sensitivity (Yao & Chen, 2017). These studies have exposed the preference in choosing cues in L2, and if the L2 morpho-syntactic cue was processable by learners from a background lack of it, however, no further exploration involved the similar but competing cues. The present research provided a new perspective by giving a multiple-level comparison between congruent cues, competing cues, and less salient L1 cues. It on one hand supported the findings that the morpho-syntactic cue was processable by learners from a background lack of it, on the other

hand, added new evidence to the interference of similar but competing cues from L1.

Finally, the present study also contributes to the exploration of cross-linguistic influence on L2 processing and has provided empirical results that a similar grammatical property (e.g., finite and non-finite distinction) in L2 may be processed in various patterns by L2 learners because of varied corresponding usages in the L1.

5.3.4.2 Implicit Knowledge vs. Explicit Knowledge

The SPR results also provided evidence on the relation between L2 learners' implicit and explicit knowledge. In the SPR experiment, cross-linguistic differences between Chinese and English finiteness and proficiency were two important factors which influenced the automatic processing of English morphological cues and caused the mapping problem. In comparison, no obvious cross-linguistic influence was found in the explicit knowledge and the only influential factor was the L2 proficiency. In general, the cross-linguistic influence in implicit knowledge and explicit knowledge showed an asymmetry: compared with the implicit processing, the explicit knowledge was less influenced by the cross-linguistic differences between L1 and L2 but mostly by L2 proficiency.

This provides new evidence and adds to the debates on the relations between the implicit and explicit knowledge. The asymmetry between the explicit and implicit knowledge found in the present study echoes previous findings that a good command of metalinguistic knowledge does not mean native-like processing (see Roberts et al., 2008; Roberts & Liszka, 2013). It supports the idea that explicit knowledge may be converted to the implicit knowledge in some conditions (R. Ellis, 1993). Learners reported to learn grammar via classroom instruction, and in this way, having acquired the explicit grammatical rules. The explicit knowledge was converted to the implicit

knowledge when the L2 proficiency was high enough. It gave support to the weak interface account that in certain conditions, such as when the L2 proficiency is high, the explicit knowledge can be gradually automatized and internalized to the implicit knowledge.

To sum up, this section introduced the online experiment in the investigation of Chinese ESL learners' processing of English finiteness in MVCs. This experiment gave a reliable test from the perspective of the implicit knowledge. In the experiment, SPR was used to look into the online sensitivity to the morphological cues in distinguishing [+F] from [-F]. The results showed that in MVCs with competing salient cue with L1, that is, [-F] as the object complement, learners showed significant differences from natives and L2 proficiency was an influential factor. It gave support to the competition model, that is, the competition between L1 and L2 salient cues posed difficulties in L2 processing; however, with the development of L2 proficiency, learners can finally be native-like. The cross-linguistic differences showed an asymmetry in their influence on explicit knowledge and implicit knowledge.

5.4 Chapter Summary

In this chapter, Chinese ESL learners' production, explicit knowledge and implicit knowledge of [+-F] distinction in English MVCs were investigated. Learners' corpora and grammaticality judgments, and online self-paced-reading tasks were used for this research purpose.

In the production of non-finite verbs, Chinese ESL learners had four types of misuses which were respectively bare verbs, over-inflection, to-do variants, and mixed-usage. Bare verbs and over-inflection were argued to be attributed to cross-

linguistic influences as they are reminiscent of the Chinese MVCs in word-by-word translation, and the other two types of errors were deducted to the developmental errors because of hypothesized false concepts and inadequate learning. Sentence types and L2 proficiency were all influential factors, as over-inflected verbs mainly appeared as the object complement and adverbial among low-proficiency learners, reminiscent with the compound predicate in Chinese MVCs. It was thus argued that there were signals of morphological and morpho-syntactic transfer in Chinese ESL learners' production of English MVCs.

To further examine whether negative transfer in the production was due to the lack of explicit knowledge of finite and non-finite distinction, the grammaticality judgment test was designed. It was found that cross-linguistic differences did not have an impact on the explicit knowledge: Chinese learners of L2 English and native English native speakers performed similarly in the judgment of the inflected [-F] no matter in which sentence types of English MVCs. L2 proficiency was an influential factor in the learners' explicit knowledge, that is, except in the sentences with non-finite verbs as adverbial where both high- and low- proficiency learners had a low acceptance to the ungrammaticality, the higher the English proficiency, the lower the acceptability.

An investigation of Chinese ESL learners' implicit knowledge of the [+-F] distinction in English MVCs was carried out via a self-paced-reading experiment. The results showed that in structures with non-competing salient cues from L1, Chinese ESL learners had native-like behaviors: both groups slowed down in processing [+F] as subject or direct object. L2 proficiency was not found to have a significant influence on the online sensitivity to the ungrammaticality of non-finite verbs. In MVCs with

competing salient cue with L1, that is, [-F] as the object complement, learners showed significant differences from natives. High-proficiency L2 learners were sensitive to the violation of [-F] as object complement while low-proficiency L2 learners did not show a robust slowdown to the violation. This indicated that the cross-linguistic differences between L1 and L2 and L2 proficiency was an influential factor. And the result that learners' processing of over-inflected verbs as adverbial was not significantly different from that of English native speakers is argued to be due to the less salience of cues in L1. L2 proficiency is not an influential factor in learners' processing of this type of MVC. It thus suggests that if the competing cue in the L1 is not salient enough, it may not influence the cue processing in L2.

Therefore, these results showed that the typological differences of finite and non-finite distinctions in Chinese and English MVCs have different degrees of influence on Chinese ESL learners' production, explicit knowledge and implicit knowledge.

6. Chapter Six English CSL Learners' Acquisition and Processing of Chinese MVCs

The typological differences of finite and nonfinite distinctions may not only influence Chinese learners' written production and L2 processing of English MVCs, but also have an effect on English learners' acquisition and processing of Chinese MVCs. How learners from the L1 with morphological [+-F] distinction acquire and process the semantic finiteness and compound predicates in the L2, remains unclear.

This chapter focuses on English CSL learners' acquisition and processing of Chinese MVCs. It is a parallel study to that described in Chapter Five, using similar integrated research methods including learners' interlanguage corpus, offline grammatical judgment test and online self-paced-reading tasks for the purpose of a bi-directional comparison. The research in this chapter aims to investigate how cross-linguistic differences influence L2 learners' different types of knowledge including production, explicit knowledge and implicit knowledge of the lexical cues in Chinese MVCs. Before that, Table 28 is displayed to remind us of the cross-linguistic differences in the Chinese and English MVCs.

There are two types of cross-linguistic differences between Chinese and English MVCs, which are respectively type I: both have finite and non-finite distinctions but the cue to distinguish them have differences; and type II: English has a finite and non-finite distinction while in Chinese pivotal and serial-events sentences aspectual morphemes can be after V_2 and thus both verbs are interpreted as finite.

Table 28 *The Comparison between Chinese and English MVCs in Chinese as the L2 study*

Cross-linguistic Difference Type I: with similar finite and non-finite distinction

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Chinese verb-subject	English [-F] as subject

Xīyān yǐjīng wéihài le tā de jiànkāng.

smoke already harm PFV his health

[-F]   [+F]

No aspect   With aspect

Smoking has already harmed his health.

[-F]   [+F]

No tense   With tense

Chinese verb-object	English [-F] as object

Gōngrénmen yǐjīng tíngzhǐ le gōngzuò.

worker already stop PFV work

     [+F]   [-F]

    With aspect   No aspect

Workers has already stopped working.

     [+F]   [-F]

    With tense   No tense

Cross-linguistic Difference Type II: finite and non-finite distinction in English vs. Chinese pivotal and serial-events sentences

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Chinese pivotal sentence	English [-F] as object complement

Lǎobǎn yǐjīnggǔlì le tā cānjiā huìyì.

boss already encourage he attend meeting PFV

     [+F]   [+F]

    With aspect   With aspect

The boss has already encouraged him to attend the meet-ing.

     [+F]   [-F]

    With tense   No tense

Chinese serial-event sentences	English [-F] as adverbial

Tā yǐjīng mǎi piào jìn le jùyuàn.

He already buy ticket enter PFV theatre.

     [+F]   [+F]

    With aspect   With aspect

He has already bought a ticket to enter the theatre.

     [+F]   [-F]

    With tense   No tense

Note. English MVCs with finite and non-finite verbs are reminiscent with Chinese MVCs, but not the translation of Chinese MVCs.

The form-meaning mapping in Chinese is opaque and optional, as the aspectual markers are not compulsory in MVCs, and morphemes such as "*le*" can function to indicate the perfective aspect or the completion of the whole sentence. Additionally, the compound predicates in Chinese MVCs have no counterparts in learners' L1. Thus, this may pose a learnability problem for English CSL learners.

6.1 Corpus-based Analysis of English CSL Learners' Written Production

With the rapid development of "teaching Chinese as foreign language" since the mid-1990s, there has been some research based on Chinese interlanguage corpus in the study of the acquisition of Chinese grammatical features. These include research on negators, the *bi* comparative structure, degree adverbs, *gei* sentences, double object structures, and figures of speech (Hua, 2009; Shen, 2009; M. Wang, 2005; D. Yang, 2004; Y. Yuan, 2005; Zheng, 2006; Zhou & Hong, 2010). There have also been error analysis studies on Chinese pivotal and serial-event sentences by learners of different language backgrounds (Zhou, 2009; Sun, 2008). However, no research to date has explored the acquisition of MVCs by English L2 learners from the perspective of cross-linguistic influences.

6.1.1 Question

With the inductive approach, the following three research questions were addressed:

What non-target-like usages English CSL learners have in Chinese MVCs?

Where non-target-like use is observed, is this a reflection of the cross-linguistic differences between English and Chinese MVCs?

Whether the sentence types and L2 proficiency affect the pattern of usage?

6.1.2 Method

6.1.2.1 HSK Dynamic Composition Corpus

Large-scale learners' interlanguage corpus in Chinese L2 includes the "Chinese Library Retrieval System" completed by the Beijing Language Institute in 1995; "Foreign Students' Chinese Interlanguage Error Corpus" established by Nanjing Normal University with 900,000 Chinese characters in 2009; "Zhongshan University foreign students interlanguage corpus" set up by Zhongshan University with 700,000 Chinese characters in 2008; "Jinan University overseas students interlanguage corpus" by Jinan University with 3,000,000 characters, and "HSK dynamic composition corpus" by Beijing Language and Culture University in 2006 with 4,240,000 characters. HSK dynamic composition corpus collected over 20,000 compositions by 11569 students in the HSK exams from 1992 to 2005 and it is the largest foreign students' interlanguage corpus in China. The errors are tagged with characters, words, sentences, passages, and punctual marks, and it is open to the public. Ren (2010) has noted that among the large-scale foreign student's interlanguage corpora, HSK is the only accessible one by the public and the others are only for internal use. This leads to the insufficient corpora-based studies (Zhang, 2010). In consideration of the scale, coverage, and accessibility of the corpora, HSK dynamic composition corpus was chosen for the investigation of English learners' MVCs acquisition in Chinese as L2.

The HSK dynamic composition corpus contains metadata about students' background such as age, country, and language skill level. In the corpus, 46 error types are labeled. The errors range from character level, word level, sentence level, to discourse level. {}is the wrong sentence tagger used to identify sentence misuses.

Sentences were tagged with this tagger after the sentence, before the sentence punctuation, and pinyin were added to briefly indicate the type of misuse.

6.1.2.2 Research Participants

The current research chose all Chinese L2 learners from the UK who took HSK from 1996 to 2005 as participants, and probed into the misuses in using the four kinds of sentences, i.e., verb-subject, verb-object, pivotal and serial-event sentences. There were 108 participants, and one of them was not recorded with a score, so there were 107 valid written compositions. Table 29 displays the brief information of English CSL learners.

Table 29 *Description of High- and Low-proficiency Learners in HSK Dynamic Composition Corpus*

Group	Certificate band	Number	Composition scores Mean (SD)	Total words
High-proficiency	A and B	44	84.77 (7.70)	19697
Low-proficiency	C and No	63	73.10 (11.34)	25135

The participants were classified into two groups according to their band of the certificate in the HSK exams, in which certificate band A and B were ranked as the high-proficiency learners while certificate C and no certificate were ranked as the low-proficiency learners. This classification method was also used by Wu (2014) in a classificatory study of Chinese as L2 learners' grammatical misuses.

6.1.2.3 Procedure and Coding Method

Sentences with verbs as subject, object, pivotal sentences and serial events sentences were all extracted from 107 raw compositions written by English CSL

learners from the UK. The misuse types were divided to mis-positioned aspectual morphemes (wrong-place "*le*"), lexical collocations and mixed sentences (two or more sentences combing together). Table 30 shows the coding method used in the current research. Examples of misuses are listed in (26)-(29).

Table 30 *Coding Method in Analyzing the HSK Dynamic Composition Corpus*

Criteria of coding	Coding method
Sentence types	1= verb-subject sentence; 2= verb-object sentence ; 3= pivotal sentence; 4=serial-events sentence
Misuse types	1= mis-positioned aspectual morpheme; 2=lexical collocation; 3=mixed sentences

Examples of misuses:

The examples of learners' misuses are as follows:

a. Mispositioned aspectual morpheme

(26) 我现在靠了自己的实力当上一位小学教师。(high proficiency)

wǒ xiàn zài kào le zì jǐ de shílì dāng shàng yī wèi xiǎo xuéjiāo shī.

I now rely ASP(le) on my own ability become a primary school teacher.

This sentence should be "*Wǒ xiànzài kào zìjǐ de shílì dāng shàngle yī wèi xiǎoxué jiàoshī*" (I now rely on my own ability become PFV a primary school teacher.) "*le*" is after V$_2$ to indicate the completion of the event.

(27) 我最终偷偷跑去了学摩托车。(low proficiency)

wǒ zuì zhōng tōu tōu pǎo qù le xué mó tuō chē.

I at last secretly go PFV learn motorbike.

The grammatical sentence is "*wǒ zuì zhōng tōu tōu pǎo qù xué le mó tuō chē*" (I at last secretly go learn PFV motorbike.) "*le*" should be after V$_2$ if the event continuum has completed.

b. Lexical collocation misuses:

(28) 父母一定要给他们一个良好的榜样。(low proficiency)

fù mǔ yī dìng yào gěi tā men yī gè liáng hǎo de bǎng yàng

Parents should give them a good example.

The grammatically correct sentence is "*fùmǔ yīdìng yào gěi tāmen zuò yīgè liánghǎo de bǎngyàng*" (parents should gěi them *be* a good example). In single-verb sentences, "gěi" has the meaning of "give", and can be used as "give somebody something" however, in pivotal sentences, "gěi" is grammaticalized and is a preposition, so the V$_2$ "be" cannot be omitted.

c. Mixed sentences:

(29)   刚看完这个故事，真使我忍俊不禁。(high proficiency)

gāng kàn wán zhège gùshì, zhēn shǐ wǒ rěnjùnbùjīn

Just read finish this story, really make me laugh.

The grammatically correct sentence is "*zhège gùshì zhēn shǐ wǒ rěnjùnbùjīn*" (this story really make me laugh). Verb phrases with topic time "*gāng kàn wán*" (just

read finish) cannot function as the subject, so the sentence "I just finish reading this story" and "this story makes me laugh" were mixed together by the learners.

6.1.3 Results

Before the data analysis, normalization was performed by dividing the total number of words by the number of participants in each group and the results multiplied by the misuse counts. See Table 31 for the results of misuses.

Table 31 shows that low proficiency learners had lexical collocation misuses in using pivotal sentences and serial-event sentences which respectively accounted for 80% and 100% of the total forms of misuses, and 20% of the misuse form in pivotal sentences was the wrong place aspectual morpheme "*le*". High proficiency learners had the misuse of mixed sentences in verb-subject and pivotal sentences, and mis-positioned aspectual morphemes in serial-event sentences. The amounts of the misuses among high- and low-proficiency learners were similar in the four types of sentences.

The small number of misuses can either be interpreted as Chinese MVCs not being a difficulty for English learners or that learners avoided using MVCs. To further check if there were differences in the total usage of MVCs between the two groups of learners, I calculated the frequency of the usages of MVCs in the two groups (see Table 31). It was found that high-proficiency learners used verb subject, pivotal and serial-event sentences more frequently than low-proficiency learners, but low-proficiency learners had a more frequent usage of verb-object sentences. This indicates that except for the verb-object sentences, high-proficiency learners used MVCs more frequently than low-proficiency learners. Figure 6 gives a depiction of English CSL learners' usage and misuses of MVCs.

Table 31 *Description of the Use of MVC Sentences by English CSL Learners*

Sentence types		Low-proficiency learners	High-proficiency learners
Verbal subject	Usage counts	19.89	29.45
	Misuse counts	0	1
	Misuse types	N/A	Mixed usage
Verbal object	Usage counts	38.19	25.38
	Misuse counts	0	0
	Misuse types	N/A	N/A
Pivotal sentences	Usage counts	60.47	104.58
	Misuse counts	3.98	4.07
	Misuse types	Lexical collocations: 80% Wrong-place "le": 20%	Lexical cllocations:100%
Serial verb sentences	Usage counts	31.83	34.52
	Misuse counts	2.39	2.03
	Misuse types	Lexical collocations: 100%	wrong-place "le":100%
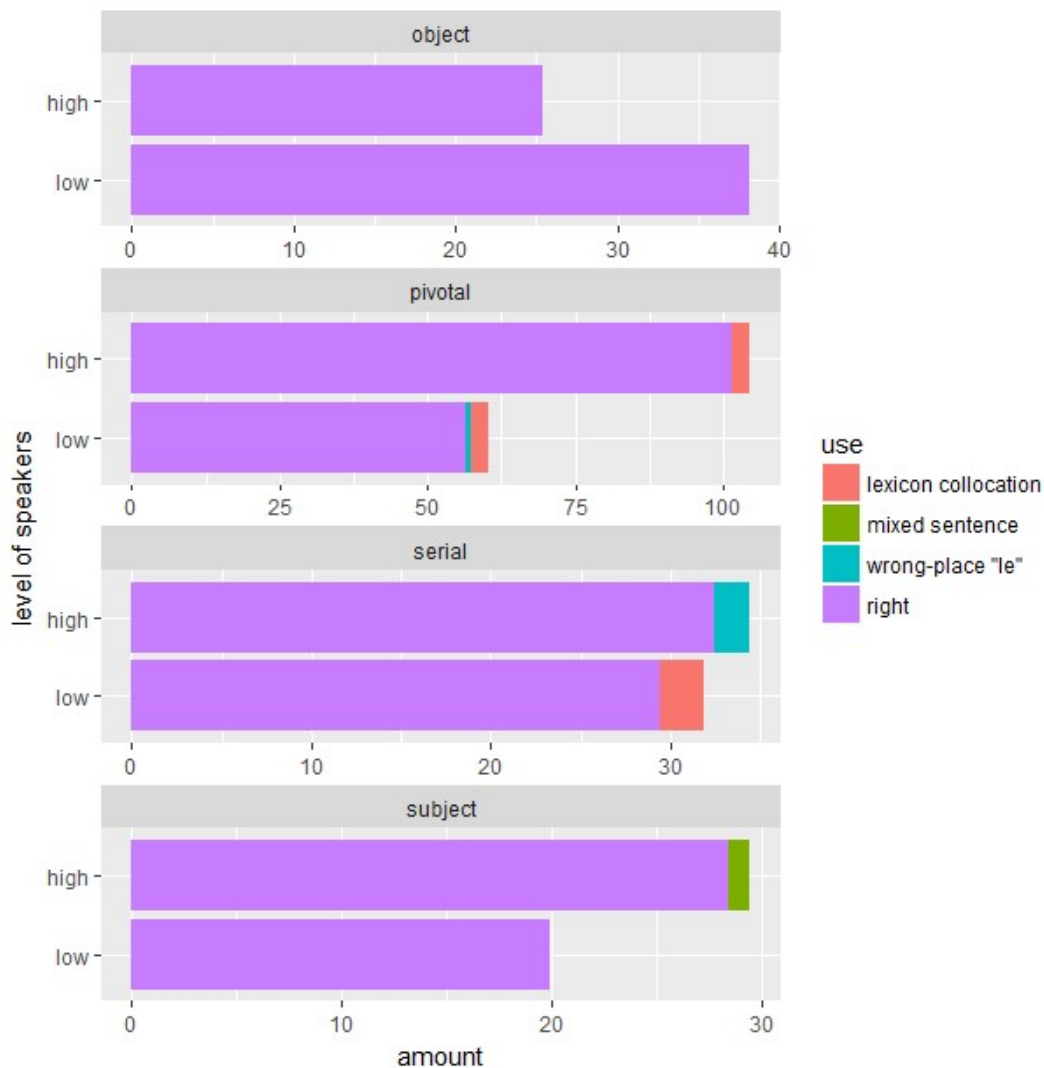
Figure 6. English CSL learners' usage and misuses of MVCs in HSK dynamic composition corpus

In general, a few misuses in Chinese MVCs were found among English learners, and the misuse forms were mis-positioned aspectual morphemes, improper lexicon allocations, and mixed sentences. More misuses were found in pivotal and serial-event sentences than in verb-subject and verb-object sentences. In comparison with low-proficiency learners, high-proficiency learners had more frequent usage in most of the MVC sentences except in the verb-object sentences. High-proficiency learners also had a more frequent usage of aspectual markers in MVCs.

6.1.4 Discussion

6.1.4.1 Cross-linguistic Influence in the Production of Chinese MVCs

The mis-positioned aspectual morphemes found in pivotal and serial-event sentences among English CSL learners are argued to be attributed to the cross-linguistic influence from the L1 morpho-syntax. The typological differences between English [-F] as object complement or adverbial sentences and Chinese pivotal or serial-event sentences are in the finite and nonfinite distinction. In pivotal or serial-event sentences, aspectual morphemes (e.g., perfective marker "*le*") can be put after V_2 to indicate the completeness of the event continuum, and thus both verbs are finite. This is different from the clear finite and non-finite distinction in English, even though the word order, positions of verbs in these sentences are reminiscent between English and Chinese. English CSL learners may have regarded *"le"* (perfective aspectual particle) as the marker of past tense (*-ed*), and added *"le"* after the matrix verb to express the past time (see examples in (26) (27) and misuse counts in Table 31). Therefore, morpho-syntactic transfer occurred. This interpretation is also confirmed by the fact that no mis-positioned aspectual markers were observed in verb-subject or verb-object sentences, as in these sentences the position of "*le*" is consistent with the position of "*-ed*" in the English counterpart. The corpus-based analysis indicates that the morphological finiteness in English did have some influence on the production of Chinese MVCs in L2, and the influence was reflected as morpho-syntactic transfer.

The current research provides new evidence on how English morpho-syntactic features influence the acquisition of Chinese structures. This is consistent with Jin (2009)'s findings that English CSL learners are inclined to regard morpheme "*le*" as a tense marker and equate it to the English "*-ed*". The present findings imply that

English learners not only equated the tense marker to the aspectual marker to express the temporal information, but also transferred the more abstract property "finiteness", which is marked by the tense marker in their L1, to Chinese.

6.1.4.2 The Role of L2 Proficiency in the Production of Chinese MVCs

L2 proficiency was not found to make a difference in the number of misuses, however, it played an important role in the frequency of using MVCs. That is, the higher the L2 proficiency, the more usage of pivotal and serial-events sentences. This can be interpreted as the natural developmental sequence in the L2 acquisition, that is, learners developed L2 competence gradually, from using simple sentences to complex sentences, and with the development of the L2 proficiency, learners would be more and more confident in using the relatively complex sentences. It may also be argued to be the intentional avoidance as a communication strategy. "It is obvious that communication strategy is the conscious employment of verbal mechanisms for communicating an idea when linguistic forms are not available to the learner for some reasons" (Heydari & Bagheri, 2012, p. 1584). L2-Chinese learners were found to underuse pivotal sentences and serial-event sentences in comparison with Chinese natives in previous corpus-based studies (Zhou, 2009; Sun, 2008), and the present study showed that English CSL learners of low-proficiency had even fewer usages of these sentences.

Other misused forms include the mixed sentences and improper lexicon allocation (see example (28) (29)). These were possibly attributed to the intralingual or developmental misuses, suggesting learners' unfamiliarity to the sentence patterns and lexicon allocation due to inadequate learning.

In sum, these results answered the research questions about what non-target like

usages English CSL learners may have, and if they are a reflection of the cross-linguistic influence. The corpus analysis showed three types of misuses: mis-positioned aspectual morphemes, lexicon collocations and mixed sentences. Mis-positioned aspectual morphemes were argued to be the reflection of cross-linguistic influence from L1 reminiscent sentences. Furthermore, the sentence types in Chinese MVCs did make a difference; that is, mis-positioned aspectual morphemes were not noticed in sentences with verb-subject or verb-object. Misuses appeared randomly among CSL learners of different proficiencies, and no certain tendency was found with the increase of proficiency. However, L2 proficiency was found to play a role in the frequency of using MVCs, that is, except for the verb-object sentences, low proficiency learners tended to use fewer MVCs.

6.1.4.3 Limitations

Even though HSK is one of the largest Chinese L2 learners' interlanguage corpora, there are some limitations in the corpus analysis. First, the Chinese as L2 learners' interlanguage corpus has the limitation of small-scale, unbalanced learners' background and inaccurate annotation. McEnery and Xiao (2016) state that:

> Existing Chinese learner corpora also suffer from a lack of balance in terms of learners' first language backgrounds and the nature of the data included in the corpora. They are seriously biased towards Asian learners such as Korean, Japanese, and Southeast Asian learners, while learners from Europe and the Americas are seriously under-represented. The range of genres in the learner material is limited–such corpora are almost exclusively composed of compositions completed by foreign learners under test conditions. They also suffer from inaccurate and inconsistent annotation and limited public availability.

(p. 449)

Second, as a common disadvantage in all corpora studies, the recorded learners' nationality cannot fully expose learners' learning background. This is very different from Chinese ESL learners' interlanguage corpora, because English is the compulsory course in China and students have similar classroom instruction background with the same syllabus and textbooks. By comparison, English CSL learners who attended HSK may acquire Chinese by natural exposure, self-study, or classroom instruction, which to some degree blurs the source of influence

Even though a handful of misuses were found in the corpus analysis, with the factors of a small-size sample pool, naturalistic productions and possibly varied learning method, it is immature to argue that English learners had no difficulty in acquiring Chinese MVCs. The corpus analysis in the current study exposed the morpho-syntactic transfer from English [+-F] distinction to Chinese pivotal and serial-event sentences, which implies that learners may be not aware of the function of the lexical cues in interpreting Chinese MVCs.

To sum up, this section specified the corpus analysis of English CSL learners' production of Chinese MVCs. The results indicated the cross-linguistic influence in the form of the mis-positioned aspectual markers in English CSL learners' production of pivotal and serial-event sentences. It suggests that English CSL learners may have used the tense cues in their L1 to interpret and compose Chinese structures with multiple verbs. It thus raises the question about whether English learners have the knowledge of the lexical cue to distinguish the finite and non-finite verbs in Chinese MVCs. Therefore, grammaticality judgment tests were designed and will be introduced in the next section.

6.2 English CSL Learners' Explicit Knowledge of the Lexical Cue in Chinese MVCs

In comparison with the explicit, consistent English morphological distinction of finite and non-finite verbs in all types of MVCs, multiple verbs in Chinese mono-clause present the character of implicity in cue and opacity in interpretation. Interrelations among multiple verbs can be diagnosed in the way of "broad morphology" (Fang, 1939). It means that even though there are no morphological inflections in Chinese, it is a characteristic that some Chinese words can combine with each other, but others cannot, and this plays an important role in Chinese syntax. In Chinese MVCs, where the aspectual adverb "*yǐjīng*" (already) can be combined shows the dynamic state of the verb (e.g., "*chōuyān yǐjīng wéihài tā de jiànkāng*", (smoke already harm his health)) (Li & Thompson, 1981; Xing, 2004). This cue is in lexical rather than morphological level. To check if English learners have the metalinguistic knowledge of the lexical cue among multiple verbs, a grammaticality judgment test was designed.

6.2.1 Question and Hypothesis

The question: *if English CSL learners have the explicit knowledge of the diagnostic lexical cue in distinguishing [+-F] in Chinese MVCs and if the L2 proficiency affects this.*

Hypothesis a: English CSL learners have the metalinguistic knowledge of lexical cue in distinguishing [+-F] in Chinese MVCs. Moreover, the high-proficiency learners have better metalinguistic knowledge.

The interlanguage corpus showed that English CSL learners had a small number

of misuses in producing MVCs which may suggest a native-like comprehension in Chinese MVCs. Finiteness is a universal property, and English has both morphological and semantic finiteness, which may help English CSL learners' comprehension of Chinese semantic finiteness. Additionally, lexical adverbs were found to be one of the most elementary cues in inferring temporal information in L2 (N. Ellis, 2006). Slabakova (2015) argued that "temporal adverbs, for example, are suggested to be more basic to the expression of temporality than is inflectional morphology, since not all languages have morpho-syntactic means of signaling tense but all languages employ temporal adverbs" (p. 284). It is thus hypothesized that English CSL learners have the explicit knowledge of lexical cues in interpreting the relations among multiple verbs in Chinese.

Hypothesis b: English CSL learners do not have the explicit knowledge of the lexical cue in distinguishing [+-F] in Chinese MVCs. L2 proficiency also plays a role.

From another perspective, cues in the L2 need extra attention from learners. In Chinese, the diagnostic lexical cue is the aspectual adverb "*yǐjīng*" (already) and it is an unmovable adverb which only governs the dynamic state of the verb (J. Li & Liu, 2005; Li and Thompson,1981; Lv, 1942; Xing, 2005; Y. Yang and Tsai, 2011). "*Yǐjīng*" (already) is not allowed to be combined with verb-subject, verb-object (Li & Thompson, 1981; Xing, 2004) because they are not in dynamic state (non-finite). Besides, in pivotal and serial-events sentences, "*yǐjīng*" (already) should be put before the compound predicate because the compound predicate represents an event continuum. In English, "*already*" is not an indicator of finiteness and non-finiteness differences, and can be in several positions in a sentence. "*Already*" is usually put in the normal mid position for adverbs (between the subject and the main verb, or after

the modal verb or first auxiliary verb, or after *be* as the main verb). In other cases, "*already*" is put in the front position (before the subject), which is usually more formal. For example,

(30) Already more than fifty thousand tickets have been sold for Saturday's cup final match. ("Cambridge Online Dictionary," 2008)

"Already" can also be used at the end of a sentence for greater emphasis or show greater surprise. This is especially common in informal speaking:

(31) Gosh, he's finished painting the kitchen already! (end position is more emphatic)

Have you booked a flight already? ("Cambridge Online Dictionary," 2008)

These examples show that the positions of aspectual adverbs are more flexible in English. These cross-linguistic differences may lead to English learners' inattention to the lexical cues by English CSL learners. It is thus hypothesized that English CSL learners do not have the metalinguistic knowledge of Chinese lexical cues in MVCs.

6.2.2 Experimental Design

6.2.2.1 Materials

An untimed grammaticality judgment test was used for testing English CSL learners' explicit knowledge. Similar to the grammaticality judgment test in Chapter Five, the Likert scale method was used in the experimental design. Participants read sentences and decided as quickly as possible whether they thought the sentence acceptable or not, on a scale from 1 (least acceptable) to 6 (most acceptable) to show

different degrees of acceptability. Judgments above the median (3.5) are regarded as "acceptable" while below 3.5 as unacceptable.

"Yǐjīng" (already) was used as the diagnostic lexical cue to distinguish the finite and non-finite verbs. The test sentences with grammatical violations had the aspectual adverb "yǐ-jīng" (already) before the verb subject, object or the second verb in pivotal sentences and serial-event sentences (see Example (32)). There were 20 testing items with both grammatical and ungrammatical MVCs including four types of MVCs (sentences with verb-subject, sentences with verb- object, pivotal sentences without/ with aspectual morpheme "le", and serial-event sentences without/ with aspectual morpheme "le") and 20 fillers in the grammaticality judgment test (see Appendix 9). The materials were part of the stimuli and fillers in the online self-paced-reading task (which will be introduced in the next section) for the convenience of a comparison between metalinguistic knowledge and implicit knowledge. Even though only ungrammatical sentences can reflect the explicit knowledge, both grammatical and ungrammatical sentences were included in the test because of two reasons. First, this can provide evidence for the semantic finiteness theory. Aspectual adverbs were argued to be the criteria and cue to distinguish the finite and non-finite verbs in Chinese in theories. However, no empirical studies reported the natives' responses in this division. Comparing natives and learners' judgment on both conditions can provide empirical evidence to the Chinese finiteness distinction and an overview of the learners' metalinguistic knowledge. Second, the syntax in Chinese is more flexible than English. Different native speakers may have different kinds of interpretation, and the range of acceptability might be bigger. To have a direct and clear contrast of groups and conditions, a balanced number of grammatical and ungrammatical items were included in this task. Additionally, it was found in the corpus that English-Chinese

learners tended to equate perfective marker "*le*" to past tense marker "*ed*", while in pivotal sentences, "*le*" is more suffixed with V_2, which is different from the position of English tense marker "*ed*" (after V_1) (see Li & Cheng, 2008; Xing, 2004). In serial-events sentences, "*le*" can either be combined with V_1 to indicate that V_2 is the purpose of V_1 or be combined with V_2 referring a series of completed sub-events. Thus, testing items with different places of "*le*" in pivotal sentences and serial-event sentences were also included in the testing materials. Examples are shown in (32).

(32)　　a. Verbs as subject:

*小王知道已经抽烟危害他的健康。

*Xiaowang know already smoke harm his health.

小王知道上网已经伤害他的眼睛。

Xiaowang know surf on internet already harm his eyes.

b. Verbs as object:

*小王尝试已经创造机会。

*Xiaowang try already create chances.

小王已经打算访问中国。

Xiaowang already plan visit China.

c. Pivotal sentence:

*小王安排小李已经办理业务。

*Xiaowang arrange xiaoli already deal with business.

小王已经邀请小李观看比赛。

Xiaowang already invite xiaoli watch match.

d. Serial-event sentence:

*小王低头已经看书。

*Xiaowang lower head already read book.

小王已经花钱买书。

Xiaowang already spend money buy book

(33)   *小王逼了小明辞职。

*Xiaowang force PFV-le xiaoming resign job.

小王逼小明辞了职。

*Xiaowang force xiaoming resign PFV-le job.

6.2.2.2 Proficiency Test

The proficiency test paper (see Appendix 8) is composed of 15 reading comprehension questions and each accounts for 2 points with a total of 30 points. There are 6 Chinese passages with around 150 words in each passage. After reading, participants were asked to choose the correct answers according to their comprehension. Five 4th-year undergraduates of Chinese major in the UK attended the pilot study, their scores were respectively 28, 20, 26, 30, 24, which showed that this proficiency test paper is reliable in grading students.

6.2.2.3 Procedure

The main study was carried out in the University of Oxford, School of Oriental and African Studies in University of London, University of Sheffield, and University of Leeds with 32 3rd-year and 4th-year undergraduates of related majors in Chinese studies (age: 19-21) and China Shengli College with 25 natives of different majors (age: 18-20) as participants. The enrollment of participants was via university emails, and participants received rewards for participation. The experiment results would neither influence their exam performance nor had any relation with any kinds of

ranking in the university. All the data were anonymized after coding.

All the participants were allotted a time slot in doodle links, and one participant did the experiment at a time in a dedicated quiet room. The test procedure was similar to that in English experiments. The participant firstly signed the consent form (see Appendix 6) and read the Chinese instructions of the self-paced reading task carefully (this will be illustrated in the next section). After the online task (about 40-50 minutes), the learners were asked to do the offline grammaticality judgment test (about 20-25 minutes). The reason for arranging the offline task after the online experiment was to avoid the latter influencing the former. The independent proficiency test was carried out after the offline test only for L2 learners (about 30 minutes). Finally, participants were asked to fill in the background information questionnaire (see Appendix 7) and signed on the reward confirmation form when they received the rewards before they left.

6.2.2.4 Participants

56 participants including 24 native Chinese speakers and 32 English CSL learners participated the experiment. To control native Chinese speakers' language background and make sure that Chinese is their dominant language, I enrolled students from the vocational-technical school Shenli College (Shandong, China) as the control group. The students from this college are trained to be technicians, nurses, oil field workers, and seldom use English, with no abroad experience. English CSL learners were enrolled from Chinese-related majors in universities of the UK (the University of Oxford, University of Leeds, University of Manchester, University of Sheffield, and SOAS, London). To guarantee that the participants can comprehend Chinese MVCs, 3rd year and 4th-year undergraduates and postgraduates were chosen. All the

participants attended the test in their home country. The language background questionnaire collected in the experiment shows the information of participants in Table 32.

Table 32 *Participants' Background Information in the Chinese Experiments*

Background information	English CSL learners	Chinese natives
Number	32	24
Age	Mean= 21.55 (range: 18-26)	Mean= 20.42 (range: 19-21)
Sex	Female=14; Male =18	Female =10; Male =14
Major	5 majors	7 majors
L2 Exposure age	Mean= 17.64 (range: 12-20)	N/A
Years of learning L2	Mean= 4.24 (range: 2-10)	N/A
L2 country experience	With experience in China: 32 Length: 12 months	N/A
Self-report Chinese as L2 Proficiency	Mean=3.24/5 (SD=0.52) (5: excellent)	N/A
Learning method	100% reported Classroom instructions	N/A
Learning hours	Mean=15 hours per week (range: 4-30)	
Other Languages	French: 18 students Spanish: 7 students German: 3 students Others: 4 students	N/A

Table 32 shows that the participants in the learner group had 4.24 years' Chinese learning experience on average (range: 2-12), and began to learn Chinese at an average age of 17.64 (range: 12-20). All learners reported having learned Chinese through classroom instruction and had an intermediate to high-level Chinese proficiency

(3.24/5). 3rd-year and 4th-year Chinese majors in the universities of the UK have had a one-year experience in China in their year 2. They also had other foreign language study experiences before they learned Chinese, and the other foreign languages were linguistically close to English, such as French, Spanish, or German, and none reported to have an above-intermediate proficiency of these languages.

6.2.3 Results

In the proficiency tests, the average score was 20.5, *SD*=4.90, with the lowest score 12, and highest score 30. Figure 8 shows the distribution of scores. The mean and *SD* of learners' and native speakers' judgment on the grammatical and ungrammatical sentences are shown in Table 33. Both groups judged the ungrammatical sentences less acceptable than grammatical sentences, but it showed that there were differences of the acceptability to the anomaly in different types of sentences.
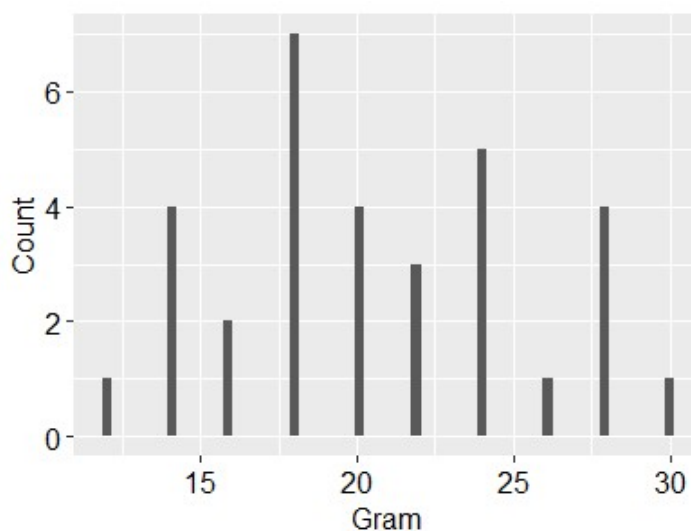
Figure 7. Proficiency of English CSL learners. Gram refers to the scores in the L2 proficiency test.

Table 33 *Description of Results in Chinese Grammaticality Judgment Task*

Groups	Grammaticality	Verb-subject Mean (*SD*)	Verb-object Mean (*SD*)	Pivotal sentence: Mean (*SD*)	Serial-event sentence: Mean (*SD*)
L2 learners	Ungrammatical	3.42 (1.77)	3.48 (1.83)	2.97 (1.59)	3.42 (1.55)
	Grammatical	5.02 (1.18)	4.98 (1.40)	5.23 (1.16)	5.30 (1.09)
Natives	Ungrammatical	1.88 (1.41)	1.83 (1.40)	2.21 (1.40)	2.38 (1.54)
	Grammatical	4.44 (1.73)	4.48 (1.65)	4.71 (1.51)	4.38 (1.55)

Linear mixed models were used to check if the learners and natives were statistically different in their judgments. The reason for adopting linear mixed models in R environment in the analysis of Chinese grammaticality judgment is that both grammatical and ungrammatical sentences were designed in the judgment. There are variables of grammar (grammatical vs. ungrammatical) and group (learners vs. natives), so the mixed model is more fitful for data analysis.

Native Chinese speakers' and English CSL learners' judgments were analyzed in R environment, with a random intercept for both participants and items. The four types of sentences were analyzed separately, and the judgment was modeled with fixed factors of groups (natives vs. learners) and grammaticality (grammatical vs. ungrammatical), e.g., lmer (judgment~ grammaticality*group+ (1|subject) + (1 | item). In learners group, fixed factors are grammaticality (grammatical vs. ungrammatical) and proficiency (continuous variable), e.g. lmer (judgement~ grammaticality*proficiency+ (1|subject) + (1 | item). "Any t value with an absolute value exceeding 1.96 is considered statistically significant at an alpha level of *p<.05 " (Leal, Slabakova & Farmer, 2016, p. 17).

Analyses showed that the interaction between grammaticality and group in verb subject and verb-object sentences was significant, implying that in judging "*yǐjīng*" before verb-subject or verb-object, natives and learners performed significantly different (in verb subject sentences: *β*=0.94, *SE*=0.35, *t*= 2.68, **p*<.05; in verb-object sentences: *β*=1.05, *SE*=0.38, *t*=2.74, **p*<.05). And in learners' group, the interaction between proficiency and grammaticality in verb-subject sentences was not significant and it displayed that the L2 proficiency did not make any differences in learners' judgment of grammaticality (in verb-subject sentences: *β*=0.07, *SE*=0.05, *t*=1.41, *p*>.05) But in verb-object sentences, the interaction between proficiency and grammaticality was significant (*β*=0.12, *SE*=0.06, *t*=2.23, **p*<.05) which implied the higher the proficiency, the lower the acceptability to the unacceptability. The estimate, *SE* and *t* value of the fixed factors are shown in Table 34.

In pivotal sentences and serial-event sentences, there was no interaction between grammaticality and group (pivotal sentence: *β*=0.14, *SE*=0.36, *t*=0.39, *p*>.05; serial-event sentence: *β*=0.03, *SE*=0.34, *t*=0.09, *p*>.05) which means that natives and learners were not significantly different in judging grammatical and ungrammatical sentences. Proficiency had an interaction with grammaticality (pivotal sentence: *β*=0.17, *SE*=0.04, *t*=3.76, **p*<.05; serial-event sentence: *β*=0.08, *SE*=0.04, *t*=1.98, **p*<.05), which showed that the higher the proficiency, the lower the acceptability to the ungrammaticality. Analysis results are shown in Table 35.

Table 34 *Mixed Model Analysis of the Judgments in Sentences with Verb-subject or Verb-object*

Sentence types	Fixed factors	Estimate	SE	t value	p-value
Verb subject sentences	Grammaticality (grammatical)	1.63	0.23	7.09	*p<.05
	Group (native)	-1.55	0.34	-4.60	*p<.05
	Proficiency	-0.09	0.04	-2.06	*p<.05
	Grammaticality (grammatical)*group (native)	0.94	0.35	2.68	*p<.05
	Grammaticality *proficiency	0.07	0.05	1.41	*p>.05*
Verb object sentences	Grammaticality (grammatical)	1.59	0.25	6.34	*p<.05
	Group (native)	-1.65	0.33	-5.04	*p<.05
	Proficiency	-0.14	0.04	-3.31	*p<.05
	Grammaticality (grammatical)*group (native)	1.05	0.38	2.74	*p<.05
	Grammaticality *proficiency	0.12	0.06	2.23	*p<.05

Table 35 *Mixed Model Analysis of the Judgments in Pivotal Sentences or Serial-event Sentences*

Sentence types	Fixed factors	Estimate	*SE*	*t* value	*p* value
Pivotal sentence	Grammaticality (grammatical)	2.36	0.24	9.95	**p<.05*
	Group (native)	-0.76	0.28	-2.77	**p<.05*
	Proficiency	-0.11	0.04	-3.09	**p<.05*
	Grammaticality (grammatical)*group (native)	0.14	0.36	0.39	*p>.05*
	Grammaticality *proficiency	0.17	0.04	3.76	**p<.05*
Serial-event sentence	Grammaticality (grammatical)	1.97	0.22	8.96	**p<.05*
	Group (native)	-1.05	0.30	-3.46	**p<.05*
	Proficiency	-0.08	0.04	-2.08	**p<.05*
	Grammaticality (grammatical)*group (native)	0.03	0.34	0.09	*p>.05*
	Grammaticality *proficiency	0.08	0.04	1.98	**p<.05*

Additionally, aspectual morphemes with pivotal and serial-event sentences were also tested in the grammaticality judgment task. Native Chinese speakers prefer "*le*" after V_2 in pivotal sentences, with a higher acceptability (*le* after V_1: *M*=2.67, *SD*=1.61; *le* after V_2: *M*=5.08, *SD*=1.56), and they are significantly different (*t*(23)=-6.28, **p*=.000, <.05). English CSL learners judged aspectual morpheme after verb 1 more acceptable in pivotal sentences (*le* after V_1: *M*=4.68, *SD*=1.49; *le* after V_2: *M*=2.96, *SD*=1.50), and t-test shows that "*le*" after V_1 is significantly more acceptable (*t*(31) =5.09, **p*=.000, <.05).

In serial-event sentences, Chinese native speakers judged V_1 with "*le*" and V_2

with "*le*" with no significant differences (*le* after V_1: *M*=4.04, *SD*=1.68; *le* after V_2: *M*=3.83, *SD*=1.37; *t*(23)=.562, *p*=.58, >.05). English learners of Chinese judged V_1 with "*le*" more acceptable (*le* after V_1: *M*=4.46, *SD*=1.73; *le* after V_2: *M*=3.03, *SD*=1.82; *t*(31)=3.26, *p*=.003, <.05). The distribution of the learners' and native speakers' grammaticality judgments in the four types of MVCs is shown in Figure 8.
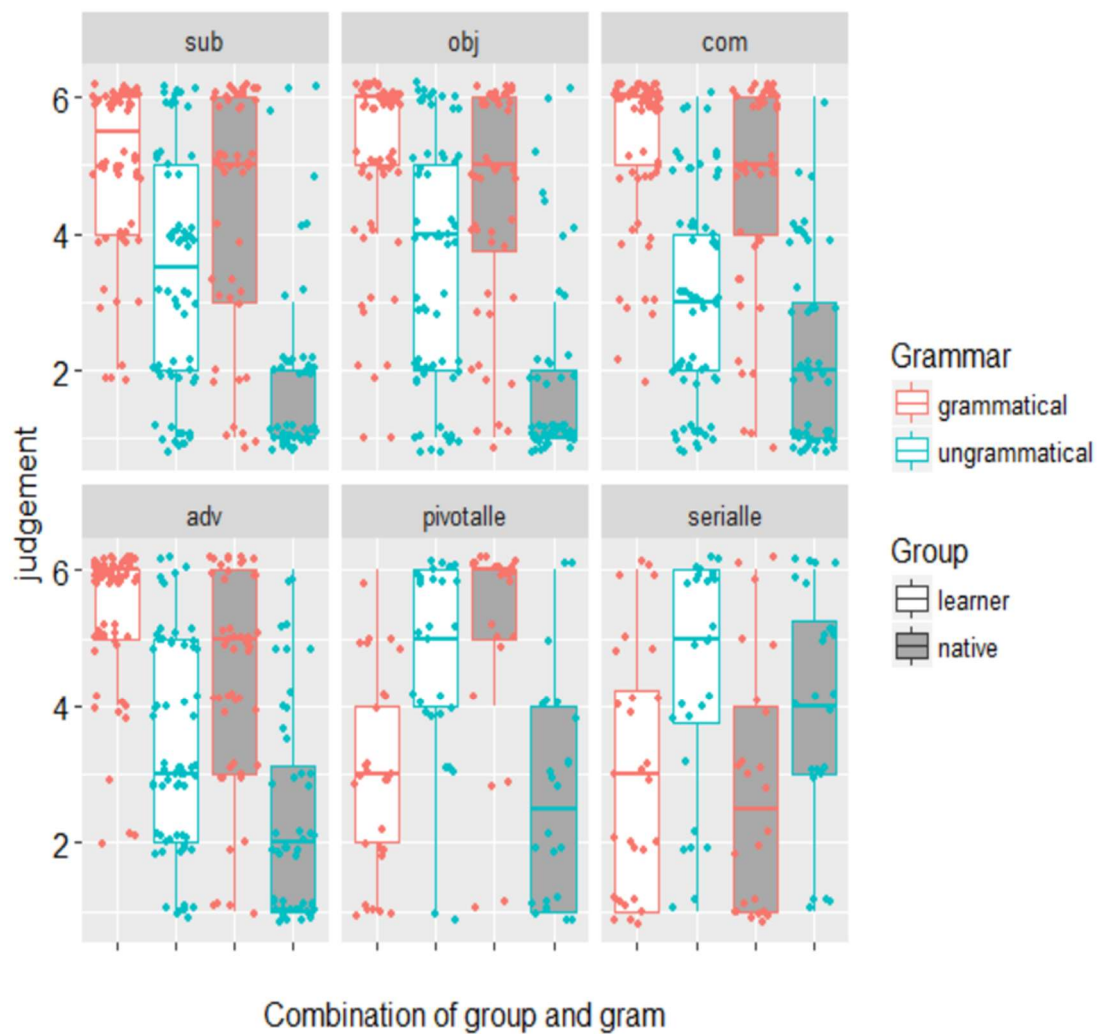
Figure 8. Distribution of English CSL learners and Chinese natives' grammaticality judgment

In general, GJ test was designed to investigate English CSL learners' metalinguistic knowledge of using temporal adverbs as a lexical cue to distinguish the finite and non-finite verbs. It was found that in sentences with verb-subject or -object, English CSL learners judged "*yǐjīng*" (already) before the non-finite verbs as acceptable (ASPA+verb-subject: *M*=3.42 (near 3.5), *SD*=1.77; ASPA+verb-object: M=3.48 (near 3.5), *SD*=1.83), and significantly more acceptable in comparison with Chinese natives. This implies learners' lack of the metalinguistic knowledge to the function of aspectual adverbs in the verb-subject or verb-object sentences. On the other hand, learners performed native-like in having a significantly higher acceptance of the aspectual adverb before the compound predicate in pivotal sentences and serial-event sentences. However, in pivotal and serial-event sentences with "*le*", L2 learners inclined to use the morpheme after verb 1 which was likely to be deemed by them as the only finite verb. L2 Proficiency was an important factor in verb-object, pivotal, and serial-event sentences; that is, the higher the proficiency, the lower the acceptability. These differences among groups may result from the cross-linguistic influence.

6.2.4 Discussion

The grammaticality judgment test was designed to address two questions: whether English CSL learners have the metalinguistic knowledge of lexical cues in Chinese MVCs and whether L2 proficiency is an influential factor in their judgment patterns.

Verb-subject and verb-object sentences were argued to be semantically non-finite and thus the relevant temporal interval (topic time) which is the aspect in Chinese is not allowed to be combined with them. The aspectual adverb ("*yǐjīng*") can serve as

the diagnostic tool to distinguish between finite and non-finite verbs, and only predicate verbs combine with the aspectual adverb and express the temporal information. This is the lexical cue to interpret the relations between the multiple verbs in Chinese. In contrast, "*already*", as the counterpart of "*yǐjīng*", is a temporal adverb, does not serve as the marker of finite and non-finite distinction and is more flexible in syntactic positions. It can be in the mid-position, front-position or end-position, serving for different communicational purposes. The finite and non-finite distinction in English is embodied by the morphology, that is, only finite verbs inflect with tense. Learners from an inflectional background (English) may not have the explicit knowledge of the diagnostic lexical cue in the L2 (Chinese) due to cross-linguistic differences. Influenced by the L1, learners are likely to regard the aspectual adverb "*yǐjīng*" (already) as an adverb which can govern the whole sentence instead of the nearby verb, and thus neglect its function of serving as the marker to distinguish the predicate verb and others.

The grammaticality judgment results showed that even though English CSL learners had a general higher acceptance of "*yǐjīng*" in front of the predicate verbs, their degree of acceptability to the aspectual adverb "*yǐjīng*" in front of the verb-subject and verb-object was significantly higher than that of natives. It suggests learners' higher acceptability to the violation of the lexical cue than natives. English learners in the current research were chosen from 3rd and 4th year Chinese majors with at least 1500 words Chinese vocabulary and have learned Chinese MVCs and "*yǐjīng*" (already), so the offline insensitivity to the position of the aspectual adverb "*yǐjīng*" is unlikely to be caused by the sentence complexty. With a control of other variables, such as age, proficiency, way of learning, the results confirmed the hypothesis based on the cross-linguistic influences. Other factors including the salience of cue may also

contribute to learners' non-native like performance because the lexical cue is a diagnostic method to make a finite and non-finite distinction and it is implicit in the sentence. Additionally, L2 proficiency was not found to influence the judgment of the ungrammaticality in verb subject sentences, but in verb-object sentences, the higher the proficiency, the lower the acceptability to the ungrammaticality.

With regard to whether English CSL learners have the metalinguistic knowledge of comprehending the multiple verbs in pivotal and serial-event sentences, the grammaticality judgment results showed that English learners were not significantly different from native Chinese speakers in judging the position of the aspectual adverb. In English, the aspectual adverb "*already*" is used to govern the whole sentence and put before the verb 1 in sentences with non-finite verbs as object complement or adverbial and thus share similarities with Chinese. However, the non-finite verb can neither inflect nor combine with the temporal information. Influenced by the finite and non-finite distinctions learners had a significantly higher acceptance to the aspectual morpheme "*le*" after the V_1 which showed learners' inclination of regarding V_1 as the only finite verb. In the serial-event sentences, without any markers, the bare verbs can convey two kinds of interpretation, either as a consecutive of two sub-events or V_2 as the purpose of V_1. Chinese natives' judgment to "*le*" after V_1 or V_2 did not show a significant difference. English CSL learners judged "*le*" with V_2 significantly less acceptable which indicates that they tended to interpret the V_1 as the finite verb and regarded V_2 as the purpose of V_1 just as that in [-F] as adverbial sentences in English. The results in pivotal and serial-event sentences gave clear evidence that English CSL learners were influenced by the syntactic structures in L1 and comprehended the multiple verbs according to the finite and non-finite distinctions in English.

The grammaticality judgment results showed that the cross-linguistic differences between Chinese and English MVCs influenced English CSL learners' comprehension. Learners tended to use the finite and non-finite distinction in their L1 to analyze and comprehend the compound predicates. They also had higher acceptability to the ungrammatical sentences with the aspectual adverb "*yǐjīng*" before the verb-subject or verb-object which indicates their inattention to the role of the lexical cue in distinguishing finite and non-finite verbs.

This study has enriched the literature in understanding cross-linguistic influence on learners' comprehension and it is the first time that Chinese MVCs including verb subject, object sentences, pivotal and serial-event sentences are investigated with both natives and learners' groups. It also provides empirical support to the semantic finiteness.

6.2.5 Limitations

The current study enrolled 56 participants with 20 test items which met the requirement of the sample size and the target power. However, if time and condition permit, all the stimuli in the self-paced-reading tasks may be used in the grammaticality judgment task in the future studies, and the comparison would be more convincing. The similar study can be seen in Roberts & Liszka (2013).

In sum, the grammaticality judgment task showed that English CSL learners were lack of the explicit knowledge of the lexical cue in distinguishing the semantic finite verb from non-finite verbs in verb subject or object sentences. They also showed the inclination of regarding the first verb in a compound predicate in pivotal and serial-event sentences as the only finite verb. English CSL learners' judgment on both

categories of Chinese MVCs displayed their lack of explicit knowledge to the salient cue or multiple verb relations and this was attributed to the cross-linguistic influence. However, it is still unclear if English CSL learners' have the implicit knowledge of the lexical cues in explaining the multiple verbs in Chinese MVCs. A self-paced-reading experiment was thus designed to further illustrate L2 learners' online sensitivity to the position of the aspectual adverbs which are used as a diagnostic tool in distinguishing the semantic finite verb from non-finite verbs, and this will be introduced in the next section.

6.3 English CSL Learners' Online Processing of Chinese MVCs

6.3.1 Question and Hypothesis

Question: *if English CSL learners are sensitive to the lexical cue of finiteness in Chinese MVCs online and if L2 proficiency affects this.*

Hypothesis a: English CSL learners are not sensitive to the lexical cue of semantic finite and non-finite distinctions in all types of Chinese MVCs.

The Grammaticality judgment test showed that English CSL learners regarded the aspectual adverb before verb-subjects or verb-objects as acceptable. They tended to regard the first verb in pivotal and serial-event sentences as the only finite verb as what they would do to the reminiscent sentences in their L1. English learners' offline performance was argued to be due to the cross-linguistic influence; that is, the inattention to the lexical cue in the L2 because they are not salient in their L1, i.e., aspectual adverbs do not function as a marker to make the [+-F] distinctions in English. According to the competition model in L2 processing, the competing cues in L1 may also lead to the overshadowing of L2 cue processing, and L2 learners may show

inattention to the L2 cue online.

Hypothesis b: English CSL learners are sensitive to the diagnostic lexical cue of finiteness in Chinese MVCs.

In the interpretation of temporal information, lexical adverbs were one of the most elementary cues and they were more basic than the inflectional morphology because "not all the languages have morpho-syntactic means of signaling tense but all languages employ temporal adverbs" (Slabakova, 2015, p. 284). Therefore, the position of lexical adverbs may not pose a difficulty for L2 processing. Besides, non-interface account argued that explicit and implicit knowledge are in two different processing systems with different mechanisms (e.g., Hulstijn, 2002), so English learners' lack of explicit knowledge of the lexical cue in interpretating Chinese MVCs can not predict their lack of implicit knowledge. It is thus hypothesized that English CSL learners have the implicit knowledge of lexical cues in interpreting the relations among multiple verbs in Chinese.

6.3.2 Method

6.3.2.1 SPR in Chinese

Self-paced-reading tasks are suitable for checking sensitivity to grammar abnormalities, however, in Chinese as L2 studies, there have been rare time-course sensitive research (Mai, 2015). To keep the reading as natural as possible, Chinese characters instead of Pinyin and phrase-by-phrase instead of the word-by-word self-paced reading paradigm was designed in the current experiment.

The normal Chinese reading is via characters; in contrast, Pinyin is for the basic stage of learning how to pronounce the words. Thus Chinese characters are more

natural than Pinyin. In the small number of previous research involving time-course sensitivity in Chinese as L2, Chinese characters have been used (e.g., Wen and Schwartz, 2014; B. Yuan, 2017).

In addition, sentence processing is incremental and the added response times in each separated segment is not equal to the accumulative processing of these words within one region (Roberts & Liszka, 2013). "A phrase-by-phrase segmentation is closer to normal reading and may, therefore, eliminate some unnatural effects induced by the SPR task itself, such as a tendency towards highly incremental processing." (Jegerski, 2014, p.12). Given the above-stated reasons, the current experiment used the phrasal segments which can cover the alternation of conditions in one segment and avoided the critical segment at the beginning or end of the stimuli.

6.3.2.2 Materials

There were 48 stimuli in 4 sentence types and 72 fillers: sentences with verbs as subject, verbs as object, pivotal sentences, and serial-event constructions. In these sentences, the aspectual adverb "*yǐjīng*" (already) was either before or after the verb 1 and thus formed the grammatical and ungrammatical stimulus pairs v0, and the immediate following segment v0+1 which has verb 2 is also a critical segment. To avoid the "wrap-up" effect, no critical segment was at the beginning or the end of the sentence. The grammatical/ungrammatical alternation appeared only in the critical segment v0, and each segment in the 12 similar stimuli had the same word length. The examples of stimuli are shown in (34) - (37).

(34)   Examples of sentences with verbs as subject

condition	Sg. 1	Sg. 2	Sg.3	Sg. 4	Sg. 5	Sg. 6
Grammatical	他知道	抽烟已经	危害	他的	健康。	他还抽烟。
	he know	smoke already	harm	his	health.	He still smoke.
Un-grammatical	他知道	*已经抽烟	危害	他的	健康。	他还抽烟。
	he know	*already smoke	harm	his	health.	He still smoke.

He knows that smoking has already harmed his health. He still smokes.

(35)　Examples of sentences with verbs as object

condition	Sg. 1	Sg. 2	Sg.3	Sg. 4	Sg. 5	Sg. 6
Grammati-cal	小张 Xiaozhang	已经同意 already agree	帮助 help	小李 Xiaoli	同学。 classmate.	小李非常高兴。 Xiaoli very happy.
Un-grammatical	小张 Xiaozhang	*同意已经 *agree already	帮助 help	小李 Xiaoli	同学。 classmate.	小李非常高兴。 Xiaoli very happy.

Xiaozhang has already agreed to help Xiaoli's classmate. Xiaoli is very happy.

(36) Examples of pivotal sentence

condition	Sg. 1	Sg. 2	Sg.3	Sg. 4	Sg. 5	Sg. 6
Grammati-cal	小王 Xiaowang	已经邀请小李 already invite xiao-li	观看 watch	足球 football	比赛。 match.	小李非常开心。 Xiaoli very happy.
Ungramm-atical	小王 Xiao-ang	*邀请小李已经 *invite xiao-li already	观看 watch	足球 football	比赛。 match.	小李非常开心。 Xiaoli very happy.

Xiaowang has already invited xiaoli to watch the football match. Xiaoli is very happy.

(37)　Examples of serial-event constructions

condition	Sg. 1	Sg. 2	Sg.3	Sg. 4	Sg. 5	Sg. 6
grammatical	小王 Xiao-wang	已经返乡 already return home	看 visit	生病 sick	父母。 parent.	父母很高兴。 Parent very happy.

Ungrammatical	小王	*返乡已经	看	生病	父母。	父母很高兴。
	Xiao-wang	*return home already	visit	sick	parent	Parent very happy.

Xiaowang has already returned home to visit his sick parents. His parents are very happy.

The key words in the stimuli were chosen from *The Graded Chinese syllables, Characters, and words for the Application of Teaching Chinese to the Speakers of Other Languages (national standard: application and interpretation)* (HanBan, 2010). Chinese characters and words were graded from grade 1 to 3 according to the hierarchy of frequency and difficulty, in which grade 1 refers to the elementary words while grade 3 is the advanced words. Table 36 gives a brief introduction of the difficulty of Chinese characters and words according to national standard.

Table 36 *Classification of Words in Teaching Chinese as a Foreign Language Syllabus (Hanban, 2010, p. VII)*

	Grade 1 words			Grade 2 words	Grade 3 words	
Level	Elementary			Intermediate	Advanced	
Difficulty	Beginner	More frequent	Frequent	Intermediate	Advanced	More advanced
Amounts	505	837	903	3211	4175	1461

To control for the difficulty of the experimental sentences, keywords used in the critical segments in the stimuli of SPR experiment were carefully chosen, with 79.31% from words in the elementary level, 20.69% from words in the intermediate level, and none from advanced words (see Table 37).

Table 37 *Key Words in SPR Stimuli in Chinese MVCs Processing*

	Grade 1 words			Grade 2 words	Total
Level		Elementary		Intermediate	
Difficulty	Beginner	More frequent	Frequent	Intermediate	
Amounts	26	40	26	24	116
Percentage	28.20%	43.48%	28.26%	20.69%	100%

To ensure that participants can understand the meaning of the stimuli sentences, I chose the keywords in SPR and conducted a reading-aloud task. The words in the reading test were displayed in a hierarchy of decreasing difficulty (see Appendix 10). According to Jiang (2003), for Chinese as L2 learners with English as L1, knowing pronunciation and knowing the meaning of Chinese characters are significantly correlated (Phonogram r=.974; Non-phonogram r=.933). Therefore, if the participants can pronounce the words correctly, they understand the words' meaning.

To quantify how native speakers of Chinese judge the grammaticality of stimuli, 13 native Chinese speakers were tested. The participants (none of them participated in any other tasks) were chosen from middle-class workers and students from technical colleges whose daily work is not relevant to language teaching, training or research. They completed the task in their native country. The sentence judgment task included 66 items which covered 48 stimuli used in the self-paced reading experiment and 22 intermixed fillers. Participants were asked to read sentences and decide as quickly as they can, without thinking too much, whether the sentence is acceptable or not, on a scale from 1 (least acceptable) to 6 (most acceptable) with different degrees of acceptability. Scores above the median (3.5) is regarded as acceptable while below 3.5

as unacceptable.

Table 38 shows the paired sample t-test of grammatical and non-grammatical items judged by the Chinese native speakers (see example 34-37). It was found that in all conditions, grammatical sentences and ungrammatical sentences were judged significantly different, indicating that the stimulus pairs were valid for online processing test.

Table 38 *Chinese Native Speakers' Grammaticality Judgment of the Stimuli in Self-paced Reading Tasks*

Sentence types	Grammaticality	Mean	*SD*	*t*-test sig. (2 tailed)
Verb-subject	Grammatical	4.14	1.00	$t(5)=3.86$
	Ungrammatical	2.22	.34	$*p=.00$
Verb-object	Grammatical	4.58	.76	$t(5)=10.04$
	Ungrammatical	1.99	.26	$*p=.00$
Pivotal sentence	Grammatical	4.85	.40	$t(5)=8.20$
	Ungrammatical	2.03	.55	$*p=.00$
Serial-event sentence	Grammatical	4.17	.48	$t(5)=4.00$
	Ungrammatical	2.58	.99	$*p=.01$

Five 4th-year undergraduates of Chinese major from universities in the UK, together with 10 Chinese native speakers attended the pilot study. All the participants did the pilot experiment in their own country. The results from the pilot study showed that in verbal object, pivotal and serial-event sentences, L2 learners all responded faster when the aspectual adverb appeared before the verb1. In sentences with verbal subject, L2 learners processed the critical segment v0 with ungrammaticality faster. In contrast, natives processed grammatical sentences in all types significantly faster than

ungrammatical sentences. Even though these results should be confirmed in the main study, the pilot study showed that the design of self-paced reading task was workable, and it did expose some differences of native speakers and L2 learners in the online processing of MVC. Additionally, the test sentences had sufficient segments to show the "spill-over" effect, and the words' length in each segment in the stimuli were the same, and the experiment design fit our research purpose.

Table 39 *RT Results in the Pilot Study of Processing Chinese MVCs*

Sentences	Groups	Condition	V0 Mean (*SD*)	V0+1 Mean (*SD*)	V0 +2 Mean (*SD*)
Verbal - subject sentences	Natives	Ungrammatical	678 (248)	495 (106)	452 (87)
		Grammatical	577 (172)	463 (87)	405 (66)
	Learners	Ungrammatical	1539(128)	997(211)	661(193)
		Grammatical	1722(436)	864(157)	578(44)
Verbal - object sentences	Natives	Ungrammatical	450 (231)	405 (139)	380 (84)
		Grammatical	372 (132)	358 (106)	354 (71)
	Learners	Ungrammatical	1803(566)	1053(292)	961(205)
		Grammatical	1293(257)	928(242)	894(240)
Pivotal sentence	Natives	Ungrammatical	591 (464)	436 (206)	347 (90)
		Grammatical	378 (189)	393 (97)	323 (60)
	Learners	Ungrammatical	2989 (695)	819 (100)	846 (246)
		Grammatical	2330 (571)	874 (125)	752 (156)
Serial-event sentence	Natives	Ungrammatical	338 (171)	332 (121)	302 (85)
		Grammatical	347 (145)	342 (92)	321 (69)
	Learners	Ungrammatical	1822 (253)	572 (160)	1129 (245)
		Grammatical	1508 (540)	552 (84)	1203 (289)

6.3.2.4 Procedure

In the main study, participants firstly read the Chinese instructions of the self-paced reading task carefully. When they were ready, they sat in front of a 13.3-inch laptop and began to do the SPR test. A piece of paper with "是: F" and "否: J" was put next to the laptop to remind the participants of how to answer the comprehension question.

6.3.3 Results

In the reading-aloud task, participants all read the words 100% correctly, so it can be assumed that participants understood the meaning of the stimuli in the experiment. Participants were also asked to translate aspectual adverbs before the SPR experiment and 100% learners translated them correctly, which showed that they all understood the meaning of the aspectual adverbs.

The two pre-tests indicated that the difficulty of the stimuli was appropriate, and L2 learners could process these sentences. Similarly with the parallel English L2 study reported in Chapter Five, before SPR data screening or analysis, items with incorrect answers to the comprehension questions were removed to minimize the longer response time because of improper comprehension or lack of attention. The extreme response time in L2 learners' group over 10000ms and lower than 100ms were removed, and the extreme response time in natives group over 5000ms and lower than 50 ms were also removed. It deducted 1.72% of the total data. In the length-adjustment procedure, linear regressions in SPSS were used to model expected response time on the basis of each participant's overall reading speed and words' length. The variability

in RTs associated with overall reading speed on a participant-by-participant basis (see Ferreira and Clifton, 1986) was controlled. For example, one participant's expected response time in a segment was $y = 195.17x + 323.19$ (y: expected response time; x: word length). By model-predicted values subtracted from raw RTs, we got adjusted residual RTs, which served as the dependent variable for all RT analyses reported subsequently. The description of RTs of natives and learners in the grammatical and ungrammatical critical segment (v0), and the following two segments (v0+1, and v0+2) in the four types of sentences are shown in Table 40. Figure 9 displays the processing patterns of natives and learners in line charts.

Table 40 shows that in sentences with verbs as subject, learners processed ungrammatical forms faster than grammatical forms and Chinese native speakers processed in the opposite way. However, in the following segments, learners and natives had the similar processing pattern. In sentences with verbs as object, learners processed the grammatical segment averagely 458ms faster than processing ungrammatical counterparts. However, no spill-over effects were found with learners: they processed the segments immediately after the ungrammatical segment faster. In contrast, natives mainly showed the sensitivity to the ungrammaticality in the afterward segments and thus a spill-over effect occurred. In pivotal sentences, learners and natives showed a similar processing pattern, both in the critical segment and subsequent segments. In serial-event sentences, learners processed grammatical sentences averagely 347ms faster than processing ungrammatical sentences in the critical segment. This was not shown in the afterward segments. Natives processed grammatical sentences faster in all three segments, and most prominent in segment v0+1.

Table 40 *Description of RTs in Processing Chinese Sentences with MVCs*

Types	Groups	Conditions	V0 mean(SD)	V0+1 mean(SD)	V0+2 mean(SD)
Verbal subject sentences	Natives	Ungrammatical	263.20 （409.37）	255.38 （312.95）	113.00 （155.07）
		Grammatical	264.98 （485.77）	120.00 （135.61）	68.86 （106.81）
	Learners	Ungrammatical	735.08 （824.81）	699.30 （877.15）	-34.39 （290.90）
		Grammatical	999.66 （1048.56）	388.14 （528.74）	-105.44 （211.13）
Verbal object sentences	Natives	Ungrammatical	-3.95 （209.11）	120.38 （159.87）	79.43 （105.16）
		Grammatical	37.40 （267.56）	81.19 （118.65）	42.48 （89.77）
	Learners	Ungrammatical	986.91 （901.90）	497.73 （585.20）	169.11 （389.87）
		Grammatical	619.17 （843.17）	623.20 （835.99）	224.99 （453.58）
Pivotal sentences	Natives	Ungrammatical	211.56 （542.25）	144.29 （164.46）	51.68 （98.84）
		Grammatical	76.53 （358.68）	114.15 （121.53）	46.78 （117.91）
	Learners	Ungrammatical	2047.82 （1626.92）	336.47 （468.62）	153.62 （440.64）
		Grammatical	1401.98 （1149.22）	287.85 （430.21）	149.65 （428.95）
Serial-event sentences	Natives	Ungrammatical	-7.40 （321.88）	104.05 （135.01）	-31.59 （113.30）
		Grammatical	-31.55 （223.34）	81.90 （116.04）	-32.82 （110.90）
	Learners	Ungrammatical	996.83 （941.11）	95.48 （261.43）	251.04 （469.74）
		Grammatical	561.76 （873.45）	227.36 （371.76）	254.69 （404.92）
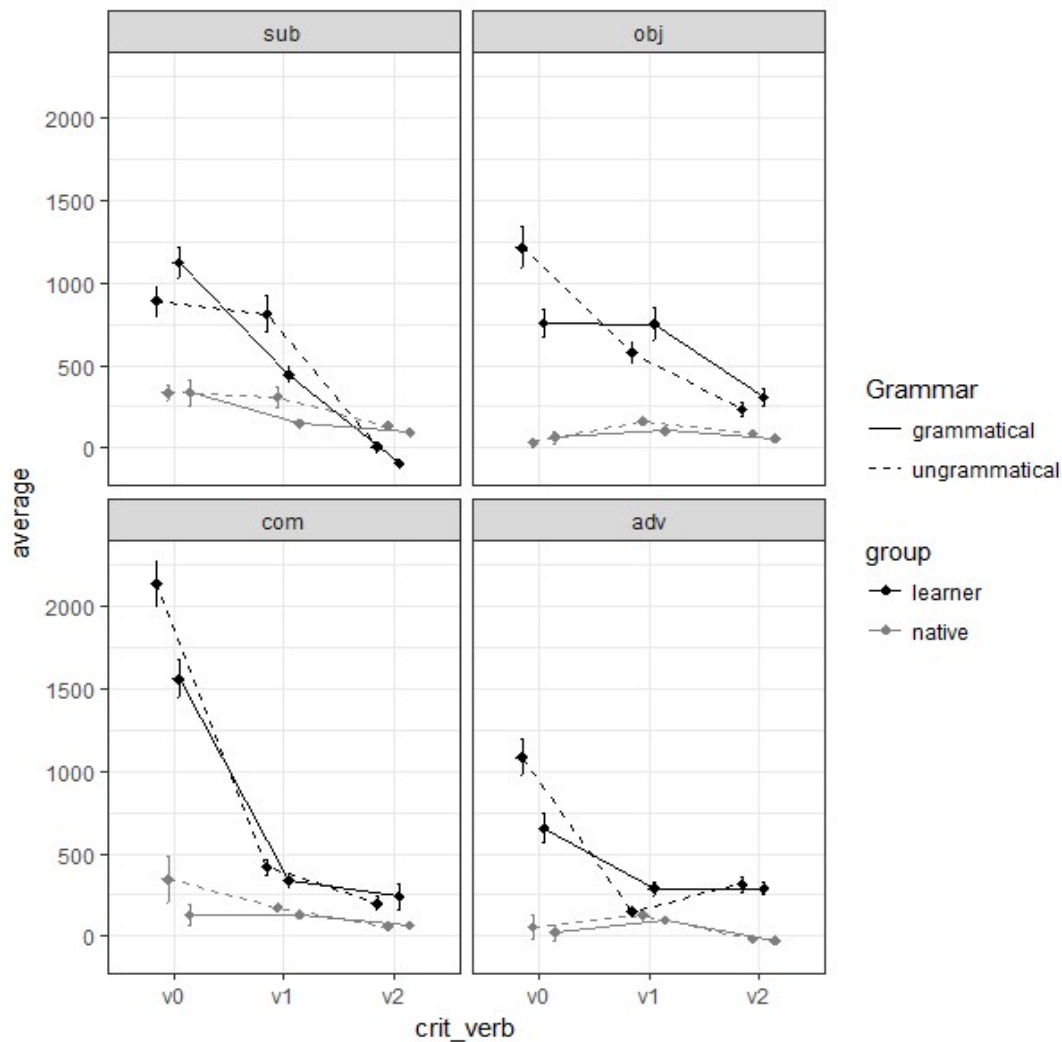
Figure 9. Learners and natives' RTs in the segment v0, v0+1, and v0+2 in either grammatical or ungrammatical condition. The error bar shows the standard errors of the data.

To see if these differences were significant, linear mixed models were used for the data analysis (see Chapter Five for the implementation of lme4 packages in R environment). The model included the grammaticality, groups as fixed factors, and a random intercept for both participants and items, e.g., lmer (resi_rts~ grammaticality*group+ (1|subject) + (1 | item1). Any *t* value with an absolute value exceeding 1.96 was considered statistically significant at an alpha level of *p*< .05 (see

Chapter Five).

In sentences with verbal subject, the mean of response time showed that in the critical segment v0, English learners processed ungrammatical word order (e.g.,"*yǐjīng chōuyān*" (already smoke)) even faster than grammatical word order (e.g., "*chōuyān yǐjīng*" (smoke already)). The model of residual RTs in v0 functioning with the gramamticality (grammatical/ ungrammatical) and group (natives/ learners) as fixed factors, and participants and items as random factors showed that processing ungrammatical segment took significantly less time than in grammatical segment (gramamtical: *β*=239.6, *SE*=122.5, *t* =1.96, **p*<.05); learners and natives' processing times were significantly different (natives: *β* =-552.6, *SE*=145.9, *t*=-3.79, **p*<.05); and there was a marginally significant effect in the interaction between groups and grammaticality (grammatical*native: *β*=-240.7, *SE*=162.7, *t*=-1.48, *p*>.05). It indicates that learners and natives processed ungrammatical and grammatical critical segments differently, and the difference reached a marginal significant level. In segment v0+1, both groups showed sensitivity to the ungrammaticality (grammatical: *β*=-356.4, *SE*=129.1, *t*=-2.76, **p*<.05); there was a significant group difference (natives: *β*=-490.3 *SE*=125.7, *t*=-3.90, **p*<.05); and there was no signifcant interaction between the grammaticality and group (grammatical*native: *β*=188.7, *SE*=139.8, *t*=1.35, *p*>.05). So learners and natives all showed sensitivity in segment v0+1. To check if there were "spill-over" effects in the subsequent segment, RTs in v0+2 was also modeled. In segment v0+2, there was also no significant effct in the group and grammaticality interaction (*β*=58.35, *SE*=43.83, *t*=1.33, *p*>.05) (see Table 41). The results showed that in processing the diagnostic lexical cue in sentences with verbal subject, Chinese natives and English learners had differences in the critical segment v0, that is, learners were less sensitive to the aspectual adverb before the subject and

the difference was marginally significant. This difference was not shown in the afterward segments.

Table 41 *The Mixed Model Analysis of RTs in Processing Chinese Sentences with Verbal-subject*

RTs	Factors	Estimate	*SE*	*t* value
	Grammaticality (grammatical)	239.6	122.5	1.96*
In Sg. V0	Group (native)	-552.6	145.9	-3.79*
	Grammaticality (grammatical)*group (native)	-240.7	162.7	-1.48
	Grammaticality (grammatical)	-356.4	129.1	-2.76*
In Sg. V0+1	Group (native)	-490.3	125.7	-3.90*
	Grammaticality (grammatical)*group (native)	188.7	139.8	1.35
	Grammaticality (grammatical)	-97.45	43.92	-2.22*
In Sg. V0+2	Group (native)	131.36	42.68	3.08*
	Grammaticality (grammatical*group (native)	58.35	43.83	1.33

In sentences with verbal object, in the critical segment v0, significant difference between processing grammatical forms and ungrammatical forms was observed (grammatical: β=-455.0, *SE*=117.1, *t*=-3.89, **p*<.05). Learners' processing time was significantly longer than natives' (natives: β=-1186.8, *SE*=165.2, *t*=-7.19, **p*<.05), and significant interaction was found in learners' and natives' RTs in processing grammatical/ ungrammatical segment (β=489.5, *SE*=167.9, *t*=2.92, **p*<.05). In the subsequent segment v0+1, learners processed those after the ungrammatical v0 even

faster, while Chinese natives processed those after the grammatical v0 faster, therefore, learners and natives showed opposite processing patterns. This difference reached a marginally significant effect (grammatical*group: β=-231.09, *SE*=127.05, *t*=-1.82, *p*>.05). In the segment v0+2, no significant interaction was observed (β=-105.60, *SE*=76.29, *t*=-1.38, *p*>.05) (see Table 42 for the detailed data). The results showed that English learners had an immediate reaction in the critical segment, and the violation caused a big RT difference, but natives did not show a big RT difference in the critical segment, therefore, there was a significant effect in the interaction between grammaticality and group. In the subsequent segments, it seemed that English learners were not affected by the preceding violation, but Chinese natives slowed down in the subsequent segment after the ungrammatical segment, and thus there was a marginally significant interaction between the grammaticality and group in v0+1. It suggested that in verbal-object sentences, both Chinese natives and English CSL learners showed their sensitivity to the position of aspectual adverb but their sensitivity was in different ways.

Table 42 *The Mixed Model Analysis of RTs in Processing Chinese Sentences with*
Verbal-object

RTs	Factors	Estimate	*SE*	*t* value
In Sg. V0	Grammaticality (grammatical)	-455.0	117.1	-3.89*
	Group (native)	-1186.8	165.2	-7.19*
	Grammaticality (grammatical)*group (native)	489.5	167.9	2.92*
In Sg. V0+1	Grammaticality (grammatical)	165.63	95.23	1.74
	Group (native)	-415.28	126.12	-3.29*
	Grammaticality (grammatical)*group (native)	-231.09	127.05	-1.82
In Sg. V0+2	Grammaticality (grammatical)	75.27	50.75	1.48
	Group (native)	-143.31	60.89	-2.35*
	Grammaticality (grammatical*group (native)	-105.60	76.29	-1.38

In pivotal sentences, processing grammatical and ungrammatical Sg. v0 was significantly different (grammatical: β=-586.9, *SE*=151.5, *t*=-3.88, *p<.05); group difference in processing segment v0 was significant (natives: β=-1797.1, *SE*=230.8, *t*=-7.79, *p<.05); however, there was no significant interaction between the grammaticality and group (grammatical*native: β=363.9, *SE*=236.4, *t*=1.54, *p>.05). It implies that English learners and Chinese natives had similar processing patterns in Sg. v0. In the subsequent segments, learners also showed native-like performance (in v0+1: grammatical*native β=41.94, *SE*=75.95, *t*=0.55, *p>.05; in v0+2: grammatical*native β=-33.11, *SE*=106.45, *t*=-0.31, *p>.05). See Table 43 for the detailed data. In general, learners and natives showed similar processing patterns and

learners had a bigger RT difference because of their slower reading speed.

Table 43 *The Mixed Model Analysis of RTs in Processing Chinese Pivotal Sentences*

RTs	Factors	Estimate	*SE*	*t* value
In Sg. V0	Grammaticality (grammatical)	-586.9	151.5	-3.88*
	Group (native)	-1797.1	230.8	-7.79*
	Grammaticality (grammatical)*group (native)	363.9	236.4	1.54
In Sg. V0+1	Grammaticality (grammatical)	-87.07	55.36	-1.57
	Group (native)	-243.88	65.74	-3.71*
	Grammaticality (grammatical)*group (native)	41.94	75.95	0.55
In Sg. V0+2	Grammaticality (grammatical)	42.19	68.18	0.62
	Group (native)	-139.23	75.01	-1.86
	Grammaticality (grammatical*group (native)	-33.11	106.45	-0.31

Finally, in serial-events sentences, participants processed grammatical segments significantly faster than processing ungrammatical ones in segment v0 (grammatical: β=-427.7, *SE*=146.9, *t*=-2.91, *p<.05); learners processed significantly slower than natives (natives: β=-1021.7, *SE*=131.4, *t*=-7.78, *p<.05); and there was a significant interaction between the group and grammaticality (grammatical*native: β=388.0, *SE*=181.9, *t*=2.13, *p<.05). It indicates that English learners and Chinese natives were both sensitive to the ungrammaticality in segment v0, and English learners' RT difference in processing grammatical/ungrammatical v0 was significantly bigger. In the following segment v0+1, natives processed those after grammatical v0 faster while

learners processed in an opposite way, and significant interaction of grammaticality and group was noticed (in v0+1: gramamticaliy*group β=-169.48, SE=62.73, t=-2.70, *p<.05). This indicates that learners and natives' online processing of segment v0+1 were significiantly different. In v0+2, no significant interaction between the grammaticality and group was found (β=10.19, SE=75.36, t=0.14, p>.05) (See Table 44 for more details of the mixed model analysis). Mixed model analysis showed that in serial-events sentences, both learners and natives were sensitive to the position of aspectual adverb, but their sensitivity were in different patterns, i.e., natives showed sensivity in both segment v0 and v0+1, while learners were only sensitive to the grammatical violation in segment v0.

Table 44 *The Mixed Model Analysis of RTs in Processing Chinese Serial-events Sentences*

RTs	Factors	Estimate	SE	t value
In Sg. V0	Grammaticality (grammatical)	-427.7	146.9	-2.91*
	Group (native)	-1021.7	131.4	-7.78*
	Grammaticality (grammatical)*group (native)	388.0	181.9	2.13*
In Sg. V0+1	Grammaticality (grammatical)	138.63	42.02	3.30*
	Group (native)	-19.90	50.35	-0.40
	Grammaticality (grammatical)*group (native)	-169.48	62.73	-2.70*
In Sg. V0+2	Grammaticality (grammatical)	-21.50	48.82	-0.44
	Group (native)	-324.09	53.13	-6.10*
	Grammaticality (grammatical*group (native)	10.19	75.36	0.14

To further investigate if L2 proficiency was an influential factor among learners, Rts in segment v0, v0+1, v0+2 were modeled with proficiency and grammaticality as fixed factors and participants and items as random factors. The results showed that in sentences with verbal subject, L2 proficiency did not have a significant influence on the processing of ungrammatical/ grammatical sentences (β =11.13, SE=13.12, t=0.85, p>.05). L2 proficiency was not detected to have an important role in English-Chinese learners' sensitivity to the position of aspectual adverbs in sentences with verbal object (β=-10.78, SE=13.90, t=-0.78, p>.05). In pivotal and serial-event sentences, the L2 proficiency was not found to be significantly influential either (pivotal sentences: β=1.87, SE=17.01, t=0.11, p>.05; serial-event sentences: β=13.90, SE=12.15, t=1.14, p>.05).

In sum, in different sentence types, different processing patterns were found. In L2 learners' group, no interaction of L2 proficiency and sensitivity to the ungrammatical segments was observed.

6.3.4 Discussion

6.3.4.1 English CSL Learners and Chinese Natives' Differences in Processing the Lexical Cues in Defining the Functions of Multiple Verbs in Chinese MVCs

Results from the SPR experiment showed that in sentences with verbal subject, learners processed the aspectual adverb before verbal subject faster than it before the predicate, while Chinese natives behaved oppositely in that they processed the latter faster. The difference showed a marginally significant effect, which means that the L2 learners were less sensitive to the position of the aspectual adverb. It verified the prediction based on the competition model (Ellis, 2005) that the processing of L2 salient cues may be overshadowed by learners' earlier experience in their L1. Because

the aspectual adverb in English may occur at the beginning of the sentence for emphasizing the time of the whole sentence and does not serve as the marker to distinguish finite and non-finite verbs, (e.g., a*lready more than fifty thousand tickets have been sold for Saturday's cup final match*), learners were predicted to be less sensitive to the position of "*yǐjīng*" in sentences with verbs as subject. "The strongest cue in one language can be one of the weakest cues in another" (P. Li, 1998, p. 34). It was thus argued that English CSL learners' less sensitivity to the positions of the aspectual adverb in Chinese MVCs confirms the prediction based on the cross-linguistic influence on L2 processing.

In sentences with verb-object, learners and natives' sensitivity to the ungrammaticality were shown in different segments. Chinese natives showed sensitivity in segment v0+1, while English CSL learners showed sensitivity in segment v0. It was possibly because when learners read the critical segment with the mispositioned aspectual adverb, they automatically regarded it as ungrammaticality because aspectual adverbs are usually put before a verb. However, when verb2 (verb-object) appears in segment v0+1, Chinese natives integrated the input and showed the "spill-over" sensitivity, while English learners even processed the segment v0+1 after mispositioned aspectual adverbs faster. And the group difference of processing segment v0+1 reached a marginal significant level. Another explanation is that learners spent a relatively long time on the critical region, which makes the spill-over effect or after-shock effect less evident. In contrast, native speakers processed the critical region fast, which is likely to lead to spill-over effects. This explanation may serve as an alternative argument to explain why there is no significant difference in processing Sg. v0+1 after grammatical/ungrammatical Sg. v0, however, it cannot explain the fact that learners processed Sg. v0+1 after ungrammatical v0 faster, and

this group difference reached a marginally significant level. Therefore, the former explanation is more convincing, i.e., English learners were sensitive to the position of the aspectual adverb before verbs, while may not be sensitive to its function of interpreting multiple verbs as the diagnostic lexical cue, and thus showed different processing patterns with native speakers.

In pivotal sentences, learners showed native-like processing patterns, which suggests learners' sensitivity to the position of the aspectual adverb in these sentences. As discussed in the cross-linguistic comparison between English and Chinese, "*already*" is seldom put in the middle of the sentence, especially between the predicate and the non-finite object complement because of incompatibility. So there was no competition form the L1. Pivotal sentences provided a contrast to others where positions of the aspectual adverbs are more flexible in learners' L1.

In serial-event sentences, English learners and Chinese natives had significant differences in the processing of critical segments, i.e., English learners had an even bigger RT difference between processing grammatical and ungrammatical forms. It was possibly due to the generally slower response time in learners' group, and their sensitivity to the ungrammaticaliy was even prominent. However, in the segment v0+1, learners processed those after the ungrammatical v0 faster, which was opposite to the natives' processing pattern. It was very likely because that leaners were only sensitive to the violation of an aspectual adverb after a verb (verb 1) in segment v0, but did not intergrate the function of an aspectual adverb in the interpretation of multiple verbs in L2 processing. So similar with the conditions in verbal-object sentences, English learners showed different processing patterns with Chinese native speakers.

With regard to the processing of the four types of MVCs, L2 proficiency was not

an influential factor. It indicates that L2 proficiency did not play an important role in the automatic processing of the cues in interrelations between multiple verbs in Chinese.

These results support the previous studies that L2 learners may apply the preference in their dominant language during L2 sentence processing (e.g., Juffs, 2005; Roberts & Liszka, 2013), and prove that there exists cross-linguistic influence in the L2 processing.

In sum, to further explore if English CSL learners from a background with morphological finiteness are sensitive to the diagnostic lexical cues (temporal adverbs) in Chinese, the self-paced-reading task was designed. The self-paced-reading task showed that English CSL learners were less sensitive to the position of the aspectual adverb "*yǐjīng*" in sentences with verbs as subject and thus confirmed our prediction of the cross-linguistic influence from the positions of "*already*" in their L1. Learners showed sensitivity to other types of Chinese MVCs; however, the different processing pattern in verbal object and serial-events sentences implied that English learners may not integrate the position of aspectual adverb (lexical cue) in interpreting the multiple verbs but have responded in the segment where there was only an aspectual adverb with a single verb. In contrast, the position of aspectual adverbs in pivotal sentences are consistent with that in English [-F] as object complement sentences, and learners had native-like processing patterns in these sentences. These findings confirmed the hypothesis based on the cross-linguistic theories and the L2 salient cues, and enriched the literature in the L2 online processing.

6.3.4.2 Relations between the Explicit Knowledge and the Implicit Knowledge

Two experiments that manipulated the position of aspectual adverbs were

designed to check English CSL learners' (from a morphological-finiteness background to a semantic-finiteness language) explicit and implicit knowledge. Explicit knowledge is the metalinguistic knowledge of the rules and facts reflected in a grammaticality judgment test, and implicit knowledge involves the automatic processing in the SPR experiment.

Results in the grammaticality judgment test showed that learners regarded the aspectual adverb before predicates as more acceptable, but they scored significantly higher acceptability to the adverb before the verbal subject or object in comparison with the native speakers. This was further reflected in the self-paced-reading task. In the online task, English CSL learners showed less sensitivity to the aspectual adverbs in front of the subject and even processed faster in the ungrammatical critical segment. This implied their lack of implicit knowledge of the function of the lexical cue. In processing the ungrammatical verbal object and serial-events sentences, English CSL learners were sensitive to the aspectual adverb after the predicate or before the verbal object, however, they showed differences in processing patterns with Chinese native speakers. The sensitivity to the critical segment was likely to be because of the automatic reflection of adverbs being in front of the verbs but not the interpretation of the relations of multiple verbs.

In the pivotal sentences, learners showed an inclination to attach both aspectual adverb and morphemes to the verb 1 and made it a counterpart of English finite verbs and neglected the uniqueness of L2 sentence structures. In the online processing task, learners showed sensitivity to the position of adverbs because of the consistency between the L1 and the L2.

Therefore, in using aspectual adverbs to distinguish the relations among multiple

verbs in Chinese MVCs, English CSL learners to some extent showed symmetry in the explicit and implicit knowledge, and both were influenced by the L1 morpho-syntactic features.

In sum, in this section, a self-paced-reading task was designed to test the online sensitivity to the positions of aspectual adverbs in processing Chinese MVCs, as the aspectual adverb "*yǐjīng*" (already) can be used as the diagnostic lexical cue for interpreting the relations between the multiple verbs in Chinese MVCs. The results showed that there were similarities and differences between natives and English CSL learners in online processing of the position of "*yǐjīng*", but learners were less sensitive to the aspectual adverb before the verb-subject and showed different processing patterns with natives in verbal object and serial-events sentences.

6.3.5 Limitations

The conclusion was based on the mixed model data analysis and many inferential tests were carried out with no adjustment of the alpha level. This may affect the choice of *t*-value chosen for significance. So replication studies are needed to confirm the conclusion.

Another limitation is that results from the online processing data in verbal subject sentences may be influenced by the complexity of embedded clauses. To avoid the "wrap-up" effect, critical segments were embedded in clauses, however, there is also possibility that learners' problem is related to the difficulty they have in dealing with the verbal subject in an embedded clause. In future studies, a further check of verbal subject sentences without embedded clauses is needed.

6.4 Chapter Summary

In this chapter, English CSL learners' interlanguage, explicit and implicit knowledge on Chinese MVCs were investigated. The results showed that:

1. In the HSK dynamic composition corpus, English CSL learners made only a few misuses in MVCs, which were mainly mis-positioned aspectual morpheme "*le*" and improper lexical collocations. The former showed that English learners tended to equate English "*-ed*" to Chinese "*le*" and regarded the verb 1 in the pivotal or serial-event sentences as the only finite verb, like what they would do in sentences with [-F] as object complement or adverbial in their L1. Additionally, L2 proficiency played a role in the usage of MVCs: higher proficiency learners inclined to use more MVCs than lower proficiency learners.

2. To further explore the cross-linguistic influence, a grammaticality judgment task was designed. The results showed that in comparison with the Chinese native speakers, English CSL learners had significantly higher acceptability to the aspectual adverb before verbal subject or object. English learners judged the aspectual adverb before verb1 in pivotal and serial-event sentences more acceptable but had the inclination of attaching aspectual morphemes to them and regarding the first verb as the only finite verb. This was argued to be attributed to the similar counterpart of non-finite verbs as object complement and adverbial in English, which reflected the cross-linguistic influence.

3. The online self-paced-reading task showed that learners were less sensitive to the aspectual adverb in front of verb-subject. In sentences with verbal subject, learners had marginal significant differences with natives in processing the critical segment with the aspectual adverb before the verb subject. It was argued to be cross-linguistic

influence as "*already*" has a more flexible position in English, and is allowed to be at the head of a sentence. In other sentence types including verbal-object, pivotal and serial-event sentences, learners showed sensitivity to the position of "*yǐjīng*" in the critical segment. However, the processing patterns of natives and learners also showed some differences in verbal object and serial-events sentences, i.e., natives integrated more segments in processing and showed their sensitivity to the position of "*yǐjīng*" when both verbs appeared and the interpretation of the fragments was certain; in comparison, learners had an immediate response when the critical segment was processed. It was argued that learners may not integrate the lexical cue in the interpretation of multiple verbs.

In general, the cross-linguistic influence was observed in both English CSL learners' production and comprehension of the Chinese MVCs.

7. Chapter Seven General Discussion

This chapter presents a discussion of the results of the empirical studies in Chapter Five and Six from a bidirectional perspective and gives a qualitative comparison between the two sets of studies. The results will be discussed from two aspects: the bi-directional comparison of Chinese-English and English-Chinese learners' acquisition and processing of MVCs in the L2; and the theoretical implications including contributions to semantic finiteness and cross-linguistic influence theories.

7.1 A Bi-directional Comparison of Chinese ESL Learners and English CSL Learners' Acquisition and Processing of MVCs in the L2

Previous chapters showed that the cross-linguistic differences of finite and non-finite distinctions between Chinese and English MVCs had influence on the L2 learners' production and comprehension. However, the cross-linguistic influence on English as L2 and Chinese as L2 learners differ in how the CLI is reflected. To have an overview of that, a bidirectional comparison is made regarding the cross-linguistic influence on the L2 production, explicit and implicit knowledge of the salient cues to interpret multiple verbs in the L2 MVCs.

In order to make the participants from the two sets of study comparable, the current research controlled potential influential variables as far as possible, such as, enrolling participants of similar ages in the experiments (range: 18-22), from universities (indicating a comparable education background and classroom instruction), employing L2 proficiency tests with the commonly used test materials.

7.1.1 Written Production

Chinese ESL learners and English CSL learners' written production were examined respectively via Chinese Learners' English Corpus (Gui & Yang, 2003) and HSK Dynamic Composition Corpus (X. Cui, 2006). Different types of misuses in MVCs were observed from the L2 learners' interlanguage analysis. English and Chinese MVCs differ not only on the morphological level (morphological [+-F] distinction in English vs. semantic [+-F] distinction in Chinese) but also on the morpho-syntactic level (morphological [+-F] distinction in English vs. finite and finite verbs in Chinese pivotal and serial-events sentences with aspectual markers), so the comparison will be given from these two aspects. L2 proficiency was found to play an important role in the production of MVCs, thus a separate sub-section will specify the role of L2 proficiency in producing MVCs in the target language.

7.1.1.1 Morphological Finiteness vs. Semantic Finiteness in Production

To recall the English and Chinese MVCs, the former is composed of morphologically different finite and non-finite verbs; in contrast, even though multiple verbs in Chinese usually take bare forms without any morphological changes, there exists semantic finite and non-finite distinction (Klein, 1998, 2006, 2009). There is a diagnostic method of using the aspectual adverb "*yǐjīng*" (already) or the aspectual morpheme "*le*" to distinguish the semantic finite verb from non-finite verbs. The placement of the perfective adverb "*yǐjīng*" and the morpheme "*le*" in Chinese verb-subject/-object sentences is consistent with the position of "*already*" and past tense marker "-*ed*" in English sentences with [-F] as subject/object. For instance, the Chinese sentence *dúshū gǎibiànle tā de mìngyùn*, "read change-le his fate" can be translated to "reading has changed his life", where "reading" is the non-finite verb.

Therefore, the difference between this type of Chinese and English MVCs, in which English non-finite verbs take the form of "V.-*ing*" or "*to* infinitive" while Chinese ones take the bare verbs, is about the morphology.

The forms in English appear to be redundant in expressing non-finiteness in comparison with bare ones in Chinese. The theory about form mapping has predicted the difficulty of acquiring redundant forms when semantic difficulty being the same (DeKeyser, 2005). Previous researchers have noticed the difficulties of acquiring rich morphology by a native speaker of a language with poor or no morphology. For instance, in Lardiere (1998)'s longitudinal study, the Chinese ESL learner was found to produce a very low rate of inflectional verbs even if the participant has acquired related features, such as word order, subject case assignments and has lived in the English-speaking country for many years. It is also deducted that from the morphological-rich L1 to the morphological-poor L2, it would be easy, because with the similar meaning L2 learners would transfer their L1 forms to nowhere (DeKeyser, 2005).

The current research found that Chinese ESL learners produced a large amount of bare verbs in subject, and bare verbs and *to do* variants in object where non-finite verbs should be used. Furthermore, there was a decline in the misuses with greater L2 proficiency. In the corpus analysis of English CSL learners' interlanguage, no misuses were found with verbal objects and only one misuse was about using a clause as the subject.

As stated in Chapter Five, the bare verbs are possibly a reflection of the cross-linguistic influence from the Chinese non-finite forms, even though the developmental problem in L2 acquisition such as simplification may also have some effects in this

misusage. Moreover, the *to-do* variants are argued to originate from the unfamiliarity of the inflections of L2. In contrast, no cross-linguistic influence was found in the opposite direction which has been reported in Chapter Six. It thus suggests that from the L1 with semantic finiteness to the L2 with morphological finiteness, morphology was a difficulty in producing MVCs and morphological transfer occurred, diminishing with greater L2 proficiency. From the L1 with morphological finiteness to the L2 with semantic finiteness, this appeared not to be a difficulty.

The forms of misuses shed some lights on how the cross-linguistic differences of the finite and non-finite distinction between English and Chinese influence L2 production. The results of the current study confirmed learnability problems regarding form mapping. That is, the difficulty of learning forms in the L2 is "the number of choices involved in picking all the right morphemes and allomorphs to express these meanings and putting them in the right place" (DeKeyser, 2005, p. 6). With the similar semantic difficulty, the redundant forms appear to pose more difficulties in L2 learning.

7.1.1.2 Morphological Finiteness vs. Compound Predicate in Production

Another type of Chinese MVCs is those with compound predicates which feature in having the same grammatical categories, such as aspect, modality, negativity or positivity, and tense (Tao, 2009). In this type, the aspectual adverb is before the compound predicate (V_1+V_2), and to indicate the completeness of the event continuum, the aspectual morpheme is after the compound predicate (V_1+V_2) in Chinese pivotal and serial-event sentences. English sentences with [-F] as object complement and adverbial always have the temporal adverb "*already*" before the predicate (V_1) and the past tense inflection "*-ed*" after the predicate (V_1), so the cross-linguistic influence is on the syntactic level rather than the morphological level. For instance, Chinese

sentence *māmā jiào wǒ huíle jiā,* "mom call me go-LE home" has the meaning of both "mom called me to go home" and "I went home".

Based on the form-meaning mapping theory (DeKeyser, 2005), it was predicted that mapping the V_1-V_2 relation with correct forms is difficult for learners of both directions, i.e. Chinese-L1-English-L2 and English-L1-Chinese-L2. Because the aspectual marker "*le*" is more suffixed with V_2 indicating the complement of the event continuum, while the tense marker "-*ed*" is always with V_1 which is the only finite verb as the predicate. The meanings of these morphemes are different, and so are the interrelations of the V_1 and V_2. As shown in previous studies, L1-L2 contrast in syntactic structures may lead to morpho-syntactic transfer (e.g., Chan, 2004; Green, 1996; Helms-Park, 2003; Hertel, 2003; Sabourin, 2001; Matthews & Yip, 2003; Xiao, 2002; Yang, 2008; Yip, 1995; Yip & Matthews, 1995) or avoidance in the production (e.g., Xiao, 2002; Jung, 2004).

Chinese ESL learners, especially low-proficiency learners, produced a large proportion of over-inflected non-finite verbs in the misuses of object complement and adverbial constructions, which indicates the syntactic transfer of Chinese compound predicates from pivotal and serial-event sentences. In the opposite direction, in English CSL learners' production, erroneously positioned morphemes and lexical collocations occurred among both high- and low-proficiency learners. In the erroneously placed morpheme items, learners put the aspectual morpheme "*le*" after V_1 which showed their inclination to interpret V_1 as the only finite verb and appeared to assume that the perfective aspect marker "*le*" has the similar syntactic function as the tense marker "-*ed*". L2 proficiency did not play a role in the types of misuses but in the frequency of using pivotal and serial-event sentences. Low-proficiency learners used proportionally

fewer pivotal, and serial-event sentences and fewer aspectual markers were found in these sentences, implying avoidance of usage among low-proficiency learners.

These results showed that Chinese ESL learners tended to regard "*le*" as "*-ed*" and transferred pivotal and serial-events sentences in their L1 to English sentences with [-F] as object complement and adverbial. In the opposite direction, English CSL learners transferred the finite and non-finite verb distinction to Chinese pivotal and serial-events sentences and appeared to regard "*-ed*" in finite verbs as the Chinese aspectual morpheme "*le*". This is consistent with L. Jin (2009)'s findings that English CSL learners, especially low-proficiency learners, have a strong inclination of regarding morpheme "*le*" as a past tense marker and equating it to the English "*-ed*". The current research provides evidence that both English CSL learners and Chinese ESL learners transfer the function of these markers from their L1 to the interpretation of multiple verbs in the L2.

The comparison suggests bidirectional cross-linguistic influence in L2 learners' production and confirms previous findings relating to typological differences between Chinese and English (e.g., Jin, 1994; Jung, 2004; Xiao, 2002; L. Yang, 2008; Yip, 1995). For instance, Chinese learners were found to produce sentences with topic-prominent features in English, such as the double nominative constructions (e.g., *Britain, have you ever been*?) (Xiao, 2002; L. Yang, 2008; Yip, 1995). While learners from a subject-prominent background (English) usually avoid L2 topic-prominent sentences. In Jung (2004)'s study, twenty-three native English speakers who were learning Korean (topic-prominent language) were required to describe a film in compositions. The compositions showed clear evidence of cross-linguistic influence that lower-proficiency English learners tended to preserve the subject and object in

Chinese sentences. The use of topic-prominent sentences such as zero anaphors, topic markers (n)un, and double-nominative constructions gradually increased with the L2 learners' proficiency.

Previous research together with the results of the current study all indicate that the L1 and L2 contrast has an influence on the second language acquisition, no matter from Chinese L1 to English L2 or from English L1 to Chinese L2. Cross-linguistic influence can be shown either as the morpho-syntactic transfer from the L1 structures or as avoiding using L2-specific sentences. The findings from the comparison provide support to the transfer theories stating that transfer occurs when the L1 and L2 have syntactic differences (Odlin, 1989) and evidence the form-meaning mapping theories (DeKeyser, 2005).

7.1.1.3 L2 Proficiency and Developmental Route

Many previous studies have demonstrated the effects of L2 proficiency in cross-linguistic influence. That is, morpho-syntactic transfer decreases with the improvement of L2 proficiency and L1-resembling structures mainly occur among low-proficiency learners (e.g., Chan, 2004; Jung, 2004; Helms-Park, 2001, 2003; Hertel, 2003). There were also researches showing that acquiring certain functional morphology which is absent in learners' L1 is especially difficult. For instance, tense markers, plurals, were observed to be omitted among Chinese ESL learners even with a high L2 proficiency (e.g., Chang, 2005; Jiang, 2004; Slabakova, 2009).

L2 proficiency plays an important role in the misuse frequency and types in Chinese ESL learners' interlanguage in the present study. Morpho-syntactic transfer from Chinese MVCs to English in the form of over-inflection occurred mainly among the low-proficiency learners in sentences with [-F] as object complement and

adverbial, but morphological transfer in the form of bare verbs was prominent among the low-, intermediate- and even high-proficiency learners in all types of MVCs. Even though the total number of misuses of bare verbs dropped among the high-proficiency learners, the dominant misuse forms were still bare verbs. It is thus assumed that Chinese ESL learners' developmental route in the acquisition of English MVCs is that: Chinese learners rely on the sentence structure and forms in their L1 Chinese to compose MVCs in English at the initial stage; with the development of L2 proficiency, the influence from L1 morpho-syntax gradually disappears, and Chinese learners can compose target-like MVCs by using the morpho-syntactic features in the L2; however, the morphological transfer is prevalent at all stages of English learning and may exist for a long time.

This finding confirms Slabokova's (2009) argument that among the difficulties associated with syntax, semantics, and morphology, functional morphology is a bottleneck in second language acquisition, which is more difficult than the acquisition of morpho-syntax, the syntax-semantics interface, the syntax-discourse interface, and the semantics-pragmatics interface. One explanation is that the functional morpheme in the L2 has no counterpart in learners' L1, and "the related meaning is not part of the routinely activated meanings in the learner's mind" (Jiang et al., 2011, p. 959).

In the opposite direction, English CSL learners with lower proficiency produced fewer pivotal and serial-event sentences in comparison with high-proficiency learners. The frequency of use of Chinese-specific sentences increases with L2 proficiency, which indicates that English CSL learners have a developmental route that begins from composing "subject+verb+object" sentences to using Chinese-specific sentences.

However, even though the cross-sectional comparison provides some

implications for the L2 developmental route, we still need to check this with longitudinal studies in the future research.

In general, the cross-linguistic differences of finite and non-finite distinctions in Chinese and English MVCs did influence L2 production, both on the form and form-meaning mapping level. Chinese ESL learners have difficulties with English non-finite forms in sentences with verbal subject or object and morphological transfer occurred; they also have form-meaning mapping difficulties in English sentences with [-F] as object complement and adverbial sentences, and morpho-syntactic transfer occurred. English CSL learners face the difficulty of form-meaning mapping, and transferred English [-F] sentences in the production of pivotal and serial-events sentences. The specific misuse types in both directions and the influential predictors are summarized in Table 45.

Table 45 *A Summary of English L2 and Chinese L2 Learners' Production of MVCs*

Sentences	Misuses and Influential factors	Proficiency	English L2 learners	Chinese L2 learners
Cross-linguistic Difference Type I: English [-F] as subject/ object vs. Chinese verbal subject/ object				
Verb-subject vs. [-F] as subject	Dominant misuses	Low	Bare verbs	None
		Intermediate	Bare verbs	
		High	Bare verbs	Mixed sentences
	CLI		√	X
	L2 proficiency		√	X
Verb object vs. [-F] as object	Dominant misuses	Low	Bare verbs; To do variants	None
		Intermediate	Bare verbs; To do variants	
		High	To do variants; mixed-usage	None
	CLI		√	X
	L2 proficiency		√	X
Cross-linguistic Difference Type II: English [+-F] vs. Chinese pivotal/ serial-events sentences				
Pivotal sentence vs. [-F] as object complement	Dominant misuses	Low	Bare verbs; Over-inflection	Underusage; wrong-place ASPM; lexicon collocation
		Intermediate	Bare verbs; Mixed-usage	
		High	Mixed-usage; bare verbs	Lexicon collocation
	CLI		√	√
	L2 proficiency		√	√
Serial-event sentence vs. [-F] as adverbial	Dominant misuses	Low	Bare verbs; Over-inflection	underusage; lexicon collocation
		Intermediate	Bare verbs; Mixed-usage	
		High	Bare verbs; To do infinitives	Wrong-place ASPM
	CLI		√	√
	L2 proficiency		√	√

Note. "√" = the corresponding item is an influential factor predictor. "X" = the corresponding item is not an influential predictor. ASPM=aspectual morpheme.

7.1.2 Explicit Knowledge

The misuses found in the production may result from L2 learners' lack of knowledge of the finite and non-finite distinction in the target language, thus grammaticality judgment tests were designed to examine Chinese and English learners' explicit knowledge. Mackey and Gass (2005) claimed that grammaticality judgment tests can examine grammatical properties intensively and thus provide sufficient evidence; can reveal whether the learners possess the knowledge of the grammatical property (with the mental representation), and thus test certain theoretical hypotheses. The comparison of the grammaticality judgment tests by Chinese ESL learners and English CSL learners will be discussed from three aspects, which are respectively the Chinese ESL learners' judgment of morphological [+-F] distinctions vs. English CSL learners' judgment of semantical [+-F] distinction; Chinese ESL learners' judgment of morphological [+-F] distinctions vs. English CSL learners' judgment of compound predicates; and the role of L2 proficiency in two learning directions.

7.1.2.1 Explicit Knowledge of Morphological Finiteness or Lexical Finiteness

In English sentences with [-F] as subject or object, only finite verbs inflect with tense, thus the salient cue to distinguish the finite verb from non-finite verbs is tense. In Chinese sentences with verb-subject or object, the cue to distinguish the finite verb from non-finite verbs is aspect, and the diagnostic method is the aspectual adverb "*yǐjīng*" (already). In other words, the finite and non-finite distinction in English is morphology while in Chinese it is lexicon.

Chinese ESL learners judged the unacceptability of inflected verbs in subject or object to a similar degree with English native speakers which suggests that they have target-like explicit knowledge of finite and non-finite distinctions. The current

research shows consistent results with previous findings that it is not a difficulty for Chinese ESL learners to comprehend English non-finite verbs, but it is more difficult to produce them (e.g., W. Shi, 2010; S. Liu, 2012; L. Yang, 2012). In the opposite direction, English CSL learners significantly differed from native Chinese speakers in judging the lexical cue in Chinese verbal-subject or verbal-object sentences. They had accepted to a higher degree the aspectual adverb in front of verbal-subject or object, which is ungrammatical. This indicates that they do not have the explicit knowledge of the lexical cue in interpreting Chinese finite and non-finite verbs. It is argued that the differences in the L2 explicit knowledge to cues are likely due to the degree of salience in cues.

The morphological cue between English finite and non-finite verbs is salient, overt, and stable. That is, the inflections in finite verbs are compulsory, close to the root and can't be substituted by other properties. In contrast, the lexical cue between Chinese finite and non-finite verbs is covert and less salient, because the aspectual adverbs are not compulsory and the diagnostic method is implicit. Therefore, the learners' inattention to the lexical cue in Chinese MVCs may be affected by the cue's low-salience (covert in classifying the finite verbs and non-finite verbs) and low reliability (optional to the finite verbs).

Additionally, the meaning of the aspectual adverb in English and Chinese are partly overlapping but not entirely equivalent. "*Already*" in English as a temporal adverb is used to indicate the temporal information of the whole event continuum. Its position in a sentence is flexible (before the predicate verb in normal cases, or at the beginning which is usually more formal, or at the end of the sentence for greater emphasis or showing greater surprise); in contrast, "*yǐjīng*" in Chinese is only

associated with the dynamic state of the verb rather than the entire sentence, and its position is unmovable (only allowed before the dynamic verb) (Li &Thompson, 1981). So, even though "*yǐjīng*" is translated to "*already*" literally and they have overlapping meaning, they differ in usage.

The results are consistent with Lin (2006)'s findings on English CSL learners' acquisition of Chinese aspectual morpheme "*guò*". In Lin (2006)'s study, it was found that English CSL learners regard the morpheme "*guò*" as a perfective marker, but somehow neglect its meaning as an experiential marker. It shows that even though "*guò*" has the overlapping function with perfective markers in English such as "have done", it has the extra meaning indicating the event was experienced by the subject. As Jiang et al. (2011) stated, the meaning of the aspectual adverb is not routinely activated as in the L1. Thus, English CSL learners showed lack of explicit knowledge of the lexical cues in Chinese MVCs.

7.1.2.2 Explicit Knowledge of Morphological Finiteness vs. Compound Predicate

Chinese ESL learners' judgment of English non-finite verbs as object complement and adverbial was not significantly different from that of native speakers. The higher the L2 proficiency, the lower the acceptance to the over-inflection in non-finite verbs. In comparison, English CSL learners showed native-like judgment to the position of aspectual adverbs in pivotal and serial-event sentences. However, in the judgment of the aspectual morphemes, it was found that English CSL learners rated the aspectual morpheme "*le*" after the first verb significantly more acceptable, indicating English learners' inclination to regard V_1 as the only finite and V_2 as the non-finite verb. Thus, the syntactic transfer was shown in their comprehension.

Previous studies have also found that English CSL learners judged Chinese-

specific sentences as less acceptable. B. Yuan (1995) found that English CSL learners, even those learners of high L2 proficiency, rated grammatical topic prominent sentences with low acceptability. Results from the current tests showed similar findings, i.e., English CSL learners judged aspectual morphemes after V_2 in pivotal and serial-events sentences, which are grammatical, as less acceptable.

The contrast between the two learning directions shows that Chinese ESL learners have the explicit knowledge in using inflectional morphology (tense) to distinguish the function of finite and non-finite verbs in English MVCs, while English CSL learners did have difficulties in using the aspectual markers to interpret the relations of the multiple verbs in Chinese. It implies that English CSL learners heavily rely on the structures in their L1 in the comprehension of reminiscent sentences in their L2, and have lower acceptability to the structures that are absent from their L1.

7.1.2.3 L2 Proficiency

In the comprehension of morphological cues, the higher proficiency learners had more target-like judgments, which shows that with the development of L2 proficiency, learners' explicit knowledge improves. In the opposite direction, the correlation between L2 proficiency and grammaticality judgments was found in Chinese sentences with verbal-object, pivotal and serial-events sentences. The interaction between the acceptability judgments and L2 proficiency indicates that English CSL learners, even those with high-proficiency, cannot use the lexical cue to infer the relations of multiple verbs in sentences with verb-subject.

In sum, L2 proficiency plays a role in Chinese ESL learners' comprehension of the salient cue in English sentences with nonfinite verbs as subject, object and object complement: the higher the proficiency, the lower acceptability to ungrammaticality.

L2 proficiency also interacts with cross-linguistic influence, that is, with increasing L2 proficiency, there seems to be less cross-linguistic influence on L2 comprehension. However, the lexical cue in Chinese verbal-subject sentences appears to be difficult for English learners of Chinese at both high- and low-proficiency level. In other sentence types, English learners have better explicit knowledge with the improvement of L2 proficiency,

A summary of Chinese ESL learners' and English CSL learners' grammaticality judgment test about the explicit knowledge of the finite and non-finite distinctions in L2 is listed in Table 46.

7.1.3 Implicit Knowledge

As well as the difficulties observed in producing and comprehending MVCs in the L2, form-meaning mapping is also cognitively effortful. Cue salience, cue complexity, and the blocking of later experienced cues by earlier learned ones can affect L2 processing (N. Ellis & Sagarra, 2010).

7.1.3.1 L2 Cues Congruent with the L1

In the processing of morphological cues, Chinese ESL learners showed sensitivity to the over-inflected non-finite forms in sentences with [-F] as subject, or object, which indicates their implicit knowledge of the distinction between morphological finite verbs and non-finite verbs. English non-finite verbs in subject or object cannot inflect with tense while Chinese verbal subject or object does not allow aspectual morphemes to be combined, and thus the cues to distinguish finite and non-finite verbs are congruent and no competition from the L1. This explains why no processing difficulties were found.

Table 46 *A Summary of* English *L2 and Chinese L2 Learners' Grammaticality Judgments (GJ) of MVCs*

Chinese ESL learners			English CSL learners		
Sentence type	GJ	L2 Proficiency	Sentence type	GJ	L2 Proficiency
[+F] as subject	√	√	ASPA before verb subject	X	X
e.g., *Jane said that had a kind-hearted neighbor was very important.			e.g., *小王知道已经抽烟危害他的健康. Xiaowang know already smoke harm his health		
[+F] as object	√	√	ASPA before verb object	X	√
e.g., *Brad aimed got the champion in the match.			e.g., *小王规划已经成立公司. Xiaowang plan already set up company		
[+F] as object com.	√	√	ASPA before V2 in pivotal sentences	√	√
e.g., *The workers elected that man spoke in public.			e.g., *小王安排小李已经办理业务. Xiaowang arrange xiaoli already deal with business		
			ASPM after V1 in pivotal sentences	X	
			e.g., *小王逼了小明辞职. Xiaowang force PFV xiaoming resign		
[+F] as adverbial	√	X	ASPA before V2 in serial-event sentences	√	√
e.g., *Emily lowered her head slightly concealed her emotion.			e.g., *小王低头已经看书. Xiaowang lower head already read book		
			ASPM before V1 in pivotal sentences	X	
			e.g., *小王启程了去美国. Xiaowang set up PFV go to America		

Note. ASPA= aspectual adverb, ASPM= aspectual morpheme, com=complement. In GJ column, "√" means that the L2 learners have similar judgments with native speakers; "X" indicates that the L2 leaners judgments are significantly different from those of native speakers. In L2 proficiency column, "√" means that L2 proficiency is an influential predictor; "X" refers that L2 proficiency is not an influential predictor.

In the opposite direction, English CSL learners showed sensitivity to the position of the aspectual adverb "*yĭjīng*" before V_2 in pivotal sentences, which implies that learners have implicit knowledge of the aspectual adverb in interpreting the relations among multiple verbs. In comparison with learners' L1, the adverb "*already*" is normally put before the predicate, and it is incompatible to be in front of object complement in reminiscent English sentences. So the position of "*yĭjīng*" in Chinese MVCs and "*already*" in English MVCs are congruent, and there is no competition from the L1.

The bidirectional comparison helped to establish that L2 learners are generally sensitive to the L2 cues that are congruent with the L1 properties.

7.1.3.2 L2 Cues Incongruent with the L1

Chinese ESL learners did not show a robust slowdown in the processing of inflected verbs as object complement, which implied the learners' insensitivity to the morphological distinction of finite and non-finite verbs in these sentences. The observed insensitivity to the inflected object complement is argued to be attributed to the competition from the pivotal sentences in L1 in which the aspectual morpheme "*le*" is more suffixed after the V_2 instead of V_1 (Xing, 2004).

In pivotal sentences, to indicate a definite endpoint of the whole event, or in other words, to show that the whole event has happened, "*le*" is compulsory, closely added to the root, and cannot be replaced by any other morphemes. For instance, *tā pài xiǎo-wáng jiē le lǎo-bǎn*, "he send xiao wang pick up boss", (he sent xiao wang and xiao wang picked up the boss). To indicate that the whole event is completed, "*le*" is grammaticalized in verb 2 in pivotal sentences. The incongruent position between the

"-*ed*" in English and the "*le*" in Chinese may have led to competition between the L1 and L2, and the processing of L2 was blocked by the L1 cues.

The findings in the present study are consistent with those of previous studies. For instance, Jiang (2004) found that Chinese L2 learners of English were not sensitive to subject-verb agreement violations in their on-line L2 processing, even though they were able to select a correctly inflected verb in an off-line forced choice task.

In the opposite direction, English CSL learners showed less sensitivity to the ungrammatically positioned aspectual adverb "*yǐjīng*" before the verb subject. The lexical cue of distinguishing finite from non-finite verbs in Chinese MVCs competed with the position of temporal adverb "*already*" in the L1 where "*already*" is permitted at the beginning of the sentence. "*Already*" can be put in the front position (before the subject), which is usually more formal in English. Thus, English CSL learners' sensitivity to the positions of aspectual adverb may have been blocked if the position of "*already*" is more flexible in their L1.

In sum, the processing of the cue in the L2 was argued to be influenced by the incongruent property in learners' L1, which led to the learners' insensitivity. N. Ellis (2006) stated that the linguistic forms that L2 learners fail to use in L2 processing are those that have cue competition or lack of salience, and these are all shaped by their L1 (p. 165). The current findings of L2 learners' processing of cues in distinguishing finite and nonfinite verbs support the competition model that the earlier experience in the L1 would cause difficulties in the processing of the L2 as the salient cue in their L1 may overshadow the salient cue in the L2 and thus block the L2 form-meaning mapping cognitively.

7.1.3.3 Low-Salient Cues from the L1

Chinese ESL learners were sensitive to the inflected verbs as adverbial. The Chinese serial-event sentences which are reminiscent of the English [-F] as adverbial sentence can be interpreted in two ways: V_2 can either be the purpose of V_1 or the two can be interpreted as consecutive events. To indicate a whole event continuum, "*le*" is not closely added to V_2, and not compulsory, so it is not grammaticalized and is not salient in interpreting the relations among the multiple verbs in serial-event sentences. The processing of L2 morphological cues was not influenced by the low-salient aspectual marker in L1.

7.1.3.4 L2 proficiency

In the sentences with inflected object complement, L2 proficiency was found to play an important role, that is, higher-proficiency learners tended to show sensitivity to the violation, while the lower-proficiency learners did not. The results suggested that the competition from the L1 property affected L2 learners' online processing of morphological cues, but L2 learners may have eventually become native-like in their processing as indicated by the improvement in processing performance with increased L2 proficiency. This is possibly because "late learners' initial L2 cue settings closely match those that they have learned for their L1, and that they only gradually get re-tuned with sufficient L2 experience" (N. Ellis & Sagarra, 2010, p. 87), but we would need a longitudinal study to check this.

In the opposite direction, even high proficiency English CSL learners did not show sensitivity to the lexical cue, which indicates that the covert lexical cue in interpreting the relations of semantic finite and non-finite verbs in Chinese MVCs is challenging to process.

In general, the online SPR tasks in the two learning directions showed that L2 learners were sensitive to the cues that are congruent with the properties in their L1 and less sensitive to the incongruent cues. The incongruent but low-salient properties in the L1 did not influence learners' online sensitivity in the L2. With increasing L2 proficiency, learners' sensitivity to the morphological cue in English MVCs increased, becoming more native-like. In comparison, the lexical cue in Chinese MVCs posed difficulties to L2 learners because of its covert, optional and opaque characteristics. A summary of Chinese ESL learners and English CSL learners' sensitivity to the salient cues is shown in Table 47.

In this section, a bidirectional comparison of L2 learners' production of MVCs in the target language, and learners' explicit and implicit knowledge of cues in L2 for the interpretation of the relations of multiple verbs was provided. It was found that cross-linguistic differences between English and Chinese MVCs had different kinds of impact on L2 learners' production and comprehension, depending on the cue salience.

Table 47 *A Summary of English L2 and Chinese L2 Learners' Sensitivity to the Salient Cues in L2 MVCs*

Chinese L1 - English L2 learners			English L1 - Chinese L2 learners		
Sentence type	Sensitivity to the morphological cue	L2 Proficiency	Sentence type	Sensitivity to the lexical cue	L2 Proficiency
[+F] as subject	√	X	Aspectual adverb before verb subject	X	X
e.g., *Jane said that had a kind-hearted neighbor was very important.			e.g., *小王知道已经抽烟危害他的健康. Xiaowang know already smoke harm his health		
[+F] as object	√	X	Aspectual adverb before verb object	√	X
e.g., *Brad aimed got the champion in the match.			e.g., *小王规划已经成立公司. Xiaowang plan already set up company		
[+F] as object complement	X	√	Aspectual adverb before V2 in pivotal sentences	√	X
e.g., *The workers elected that man spoke in public.			e.g., *小王安排小李已经办理业务. Xiaowang arrange xiaoli already deal with business		
[+F] as adverbial	√	X	Aspectual adverb before V2 in serial-event sentences	√	X
e.g., *Emily lowered her head slightly concealed her emotion.			e.g., *小王低头已经看书. Xiaowang lower head already read book		

Note. In the vertical sensitivity bar, "√" = sensitive to the ungrammaticality, as natives. "X" = insensitive or non-target-like performance. In the L2 proficiency vertical bar, "√" = L2 proficiency is an influential predictor. "X" = L2 proficiency is not an influential predictor.

7.2 Theoretical Implications

7.2.1 Empirical Support to the Semantic Finiteness Theory

The issue as to whether finiteness exists in Chinese has been controversial among linguists. The present study confirms the semantic finiteness theory, provides empirical data to support that finiteness exists in Chinese, and testifies that aspectual markers can be the diagnostic tool to distinguish the function of multiple verbs.

According to semantic finiteness theory, finiteness exists in Chinese and the finite verb is composed of topic time (aspect) and assertion (Klein, 1998, 2006, 2009; Klein, Li, & Hendriks, 2000). Aspectual adverb can only be positioned before a finite verb (Xing, 2004). The function of multiple verbs in Chinese MVCs are thus classified using aspectual adverb as the diagnostic tool.

In terms of this criterion, verbal-subject and verbal-object are non-finite, and no aspectual adverb is allowed to combine with them. Verb 1 in pivotal and serial-events sentences is finite as aspectual adverb can be combined with it. However, to indicate the completeness of the event continuum, aspectual morphmes are more suffixed with verb 2 in pivotal sentences, thus v2 can be finite; and aspectual morphmes can be either after v1 or v2 in serial-events sentences. This division provides support to the proponents of finite and non-finite distinctions in Chinese and is consistent with other proposals about the classification of Chinese MVCs. For instance, B. Yang (2015) claimed from the functional-typological perspective that verb or verb phrases as subject are non-finite clauses, pivotal and serial-event sentences are pseudo non-finite clauses, and there is the hierarchy of finite and non-finite distinctions in Chinese. However, there were no empirical data about native Chinese speakers' judgment of

the Chinese [+-F] distinctions to support these theories.

In the current research, the data of 24 Chinese native speakers' grammaticality judgments showed that Chinese native speakers judged the aspectual adverb "*yǐjīng*" before the finite verb significantly more acceptable than the adverb before the non-finite verbs (such as the verb subject or the verb object). Chinese native speakers also judged the aspectual adverb "*already*" before the V_1 and the aspectual morpheme "*le*" after V_2 in pivotal sentences significantly more acceptable, and shows their interpretation of the multiple verbs as a compound predicate. In serial-event sentences, Chinese native speakers' acceptability of the aspectual morpheme "*le*" after the V_1 or V_2 is not significantly different, which shows that the aspectual marker is acceptable both after V_1 and after V_2 depending on the interpretation. As Li and Thomson (1981) stated, in the same sentence, the sub-events can be understood as in a relation of purpose or as the serial events.

In general, the grammaticality judgment task carried out among Chinese native speakers provides empirical support to the semantic finiteness theory and extends the theory in explaining Chinese-specific sentences such as pivotal and serial-event sentences. That is, in a single clause, the semantic finite predicate may be in the form of compound predicate which is composed of more than one verb.

7.2.2 Contributions to the L2 Acquisition Research

The complexity of forms and form-meaning mapping predicted grammatical difficulties in acquisition of MVCs in L2, and the L1 transfer was observed. The role of the L1 is an important factor in SLA and the research on cross-linguistic influence experienced several stages, including recognition and investigation of the phenomenon, viewing the phenomenon as a process; explaining it with theories and

models; and exploring how it takes place in the human brain (Jarvis & Pavlenko, 2008). Through transfer analysis and empirical experiments, the current study identified cases of transfer in learners' interlanguage, probed into the role of cross-linguistic differences in the L2 comprehension, and explained it with theories and models. It thus contributes to the theories on CLI in the L2 acquisition.

7.2.2.1 Enriching the Literature about Form-meaning Mapping

How the cross-linguistic differences between English and Chinese MVCs affect L2 learning was not stated in previous studies, even though many efforts have been made in the theoretical discussion on the features in Chinese MVCs from the typological or other perspectives. The theories of grammatical learning difficulties regarding the complexity of forms, the complexity of meaning, and form-meaning mapping predict what may pose a difficulty for L2 learners (DeKeyser, 2005). The current study confirms the prediction and enriches the literature in learnability research.

Previous literature has found that morphemes like the third person *–s* (e.g., DeKeyser, 2000; Johnson & Newport, 1989) and past tense *-ed* (e.g., Hawkins & Liszka, 2003; Lardière, 2007; Y. Yang & Lyster, 2010) pose difficulties for Chinese ESL learners. The empirical data in the present study exposed Chinese ESL learners' difficulties in using the correct forms of the non-finite verbs (*-ing, to do*) in production. This reflects the difficulties caused by the complex and redundant forms in expressing the meaning of non-finiteness and thus adds to the literature about form-mapping in L2 acquisition.

As well as the problems caused by redundant forms, the optionality of aspectual morphemes/ adverbs, and opaque of the morpheme "*le*" in Chinese MVCs were also

found to be hard for L2 learners. The current research confirmed the prediction by showing that English CSL learners produced low rate of pivotal and serial-event sentences, transferred the [+-F] distinction to compound predicates, and conversely, Chinese ESL learners also transferred compound predicates to English.

The cross-sectional comparison also provides support to the hierarchy of learning difficulty by showing that L1 morpho-syntactic transfer mainly occurred in low-proficiency Chinese ESL learners' production, but morphological problems were observed in all stages of L2 learning. This provides evidence that the difficulties in the production caused by the form-meaning mapping exist at the initial stages of L2 learning, while morphological problems persist to higher levels of proficiency. It is in accordance with previous findings that "learners acquire the syntactic features easily but continue to have problems with their morphological instantiation" (DeKeyser, 2005, p. 7).

7.2.2.2 Providing Evidence of CLI in Producing and Comprehending MVCs in the L2

"CLI effects have to be investigated not only in production but also in comprehension and perception, as comprehension, in particular, remains an unexplored area in transfer research" (Jarvis & Pavlenko, 2008, p. 20). The findings in the interlanguage and grammaticality judgment task in the present study exposed what cross-linguistic influence occurred, when it occurred, and why it occurred in the acquisition of MVCs in L2 English or L2 Chinese.

1. What occurred. The cross-linguistic influence was found in both directions. Bare verbs and over-inflected non-finite forms in Chinese ESL learners' interlanguage and the underusage and mis-positioned aspectual marker of pivotal and serial-event sentences among English CSL learners confirmed previous findings that CLI

outcomes are not only misuses but also underuse or overuse of certain properties. "CLI affects not only the rate and the outcome of acquisition but also the acquisition route, or the stages and sequences learners pass through and have demonstrated that different types of CLI may occur at different stages of the learning process" (Jarvis & Pavlenko, 2008, p. 269). The cross-sectional analysis of learner corpora suggests that Chinese ESL learners' acquisition passed through a route from composing the L2 sentences with the help of the syntactic knowledge in their L1 in the initial stage to the usage of explicit knowledge in the L2 in sentence construction. Thus, the syntactic transfer occurs only among low-proficiency learners as we observed in CLEC corpus. The usage of functional morphemes is more difficult and morphological transfer was found in all levels of L2 learners. However, these implications of L2 learners' developmental route need to be further checked in longitudinal studies in future research.

2. When it occurred. Morphological and morpho-syntactic transfer occurred in Chinese ESL learners' production of English MVCs. However, the cross-linguistic influence was not found in the explicit knowledge of morphological cues of finite and non-finite distinctions. In the opposite direction, the morpho-syntactic transfer was observed in both production and comprehension of Chinese-specific sentences, i.e., pivotal and serial-event sentences. This suggests that when the L2 learners have the explicit knowledge of the grammar, the negative L1 transfer may still occur in their productions. It also shows that without the explicit knowledge of the lexical cues, L2 learners tend to underuse the special sentences which are absent from their L1, or use the similar-to-L1 structures to construct the target sentence.

3. Why it occurred. "In all learning situations, previous knowledge is a starting point for acquiring new knowledge; and in a language-learning situation, this means

previously-learned languages" (Benson, 2002, p. 69). L1 transfer may occur either consciously or unconsciously. The Chinese ESL Learners showed native-like explicit knowledge in distinguishing finite from non-finite verbs, but still, they used over-inflected forms as object complement or adverbial which suggests morpho-syntactic transfer. This might be unconscious transfer, and the results of the online processing task imply that metalinguistic knowledge was not automatized, and that the learners may have unconsciously transferred L1 structures. In the opposite direction, English CSL learners were less aware of the aspectual relations of multiple verbs in Chinese-specific sentences and thus transferred English finite and non-finite distinctions to L2.

The current findings provide support to the cross-linguistic theories that the L1 and L2 contrast would lead to learning difficulties and forward transfer (Odlin, 1989). It shows evidence that the contrast between a serializing language (the language with serial-verb constructions, e.g., Chinese) and a non-serializing language (the language without serial-verb constructions, e.g., English) would lead to the negative transfer of verb serialization in the non-serializing languages. This is consistent with Helms-park's (2003) findings that Vietnamese (serializing language) learners produced resultative serial verb constructions (e.g., make butter melt) in their English production which resembled their native language from the lexicosemantic aspect.

Results from the current research also enrich the literature in the study of cross-linguistic influence on Chinese ESL learners' acquisition of English syntactic structures. Previous studies have found reminiscent Chinese structures in Chinese ESL learners' interlanguage, such as pseudopassive, ergative constructions, pseudo-tough movement, existential constructions (Yip, 1995); relative clauses (Matthews and Yip, 2003); copula, placement of adverbs, verb transitivity (Chan, 2004); and topic-

prominent structures (Green, 1996; Xiao, 2002; L.Yang, 2008; Yip and Matthews, 1995). The current research found that Chinese pivotal and serial-event sentences also exist in Chinese ESL learners' interlanguage, and thus add to the literature of Chinese sentence structures which are possibly transferred to English.

In contrast to the large body of evidence related to morpho-syntactic transfer from Chinese to English, the transfer of English structures to Chinese has been controversial. In some previous studies, the contrast between the L1 and L2 syntactic structures poses some difficulties for L2 learners, such as the topic-prominent sentence (B. Yuan, 1995), long-distance antecedent in reflexives (B. Yuan, 1998), resumptive pronouns (RPs) in Chinese relative clauses (B. Yuan & Zhao, 2005), resultative compounds (B. Yuan, 2010). There are also some studies, however, found that the L1 and L2 contrast does not lead to learning difficulties or L1 transfer, for instance, placement of negation (B. Yuan, 2004). The current research showed that the contrast of finite and non-finite distinction in English and Chinese did cause some learning difficulties for English CSL learners, which are reflected in their underuse of the pivotal and serial-event sentences, and their intention of comprehending compound predicates to finite and non-finite verbs. Thus, it shows that a grammatical property may be transferred to L2 learners' comprehension and production of Chinese sentence structures, and supports the argument that the L1 and L2 contrasts may lead to forward transfer.

In sum, CLI is a complex issue in L2 acquisition. The comparison of the two learning directions suggests what, when, and why CLI occurs. The findings from bidirectional perspective give support to the argument that the L1 and L2 syntactic contrast would lead to learnability problems and morpho-syntactic transfer may occur. It adds to the literature in the investigation of cross-linguistic influences in second

language acquisition.

7.2.3 Contributions to the L2 Processing Research

7.2.3.1 Empirical Test of Competing Cues in the L1 and L2

With regard to how L2 learners make form-meaning connections cognitively, the competition model (MacWhinney, 1987, 2005) argues that L2 learners select from various cues according to its salience and reliability; that is, how often a cue is used, and how reliable the cue leads to the correct explanation. The competition model predicts that "in cases where L1 and L2 cues differ, the forward transfer may take place, at least in the initial and intermediate learning stages" (Jarvis & Pavlenko, 2008, p. 219).

Previous literature has found that salient cues that are used in learners' L1 may not be salient in their L2, and earlier knowledge may affect L2 processing. For instance, Chinese learners tend to use lexical, semantic, and pragmatic cues rather than the morphological cues (e.g., Luk & Shirai, 2009), while Spanish learners whose L1 has rich morphology prefer morphological cues in L2 processing (e.g., N. Ellis, 2007).

The current study used the morphological and lexical cue difference in Chinese and English and tested the competition model in L2 processing. The present research gave a specific classification of L1 and L2 cues, including the cues that are congruent (without competition), incongruent (with competition), and of low-salience. Thus, it can help to establish a clear comparison in our attempt to investigate if the cue in the L1 influences learners' cue processing in the L2.

Current findings give empirical support to the competition model. It was found that when the Chinese aspectual morpheme in verb-subject or verb-object is congruent

with the English morphological cue, learners showed sensitivity to the morphological cue. However, when the cues in L1 and L2 compete, such as in non-finite verb as object complement and Chinese pivotal sentences, learners with low proficiency appeared to rely on their L1 in syntactic processing. Furthermore, L2 proficiency plays an important role, as with the development of L2 proficiency learners made more use of L2 cues in processing. The L1 cue, which competes with the cues in the L2 but is not salient (e.g., "*le*" in serial-event sentences), does not influence learners' L2 cue processing. In contrast, English CSL learners showed sensitivity to the lexical cue (aspectual adverb "*yǐjīng*") in Chinese MVCs when no other cues compete with it; however, they were less sensitive when the usage of "*already*" in their L1 poses a competition.

This suggests that cue salience, the interaction between different cues, and competition between cues in L1 and L2 are all influential factors in L2 sentence processing, and L2 learners thus show different processing patterns because of these factors.

7.2.3.2 Confirming the Role of L1 in L2 Sentence Processing

There has been no consensus about the role of L1 in L2 sentence processing in the previous studies. Some studies showed that the differences between L1 and L2 grammatical properties pose difficulties for L2 learners in sentence processing (e.g., Juffs, 2005; Roberts & Liszka, 2013), while other studies found no cross-linguistic influence in L2 sentence processing (e.g., Felser et al., 2003; Felser & Clahsen, 2005; Gullberg & Indefrey, 2008; Roberts et al., 2008, B. Yuan, 2017).

The current research confirmed the difficulties of L2 processing caused by the L1 and L2 grammatical contrasts: Chinese ESL learners of low L2 proficiency were

not sensitive to the inflected verbs as object complement, which suggests the influence from the L1 pivotal sentences; English CSL learners were less sensitive to the placement of aspectual adverbs before the verb subject, which indicates the influence of the temporal adverb "*already*" from the L1.

This shows that sentence structures or grammatical property in the L1 have influence on L2 sentence processing, especially at the initial stage when learners' L2 proficiency is low, and thus gives evidence to the argument that incongruent grammatical property has a negative influence in L2 processing.

7.2.3.3 Relations between the Explicit and Implicit Knowledge

The current research also provides empirical data on how the cross-linguistic differences influence L2 learners' explicit and implicit knowledge of the salient cues in interpreting the multiple verbs in the L2 via offline untimed grammaticality judgment tests and online self-paced-reading tasks.

As discussed in Chapter Five, Chinese ESL learners' explicit and implicit knowledge are asymmetrical. That is, learners had the explicit knowledge of finite and non-finite distinctions in English MVCs, but they showed insensitivity to the ungrammaticality in online tasks. With increasing L2 proficiency, the learners' processing patterns became more native-like. These findings are consistent with previous research (e.g., Jiang, 2004; Roberts & Liszka, 2013) and suggests that L1 may influence implicit knowledge more than explicit knowledge.

The relation of explicit and implicit knowledge in the opposite learning direction shows some kinds of consistency: English CSL learners do not have the explicit knowledge of the lexical cue in sentences with verb-subject or verb-object, and they showed less sensitivity to the lexical cue in sentences with verb-subject and a different

processing pattern in sentences with verb-object in comparison with the native Chinese speakers. It is possible that, when L2 learners do not possess explicit knowledge of the grammar, they cannot process sentences target-like in real time.

The comparison of implicit and explicit knowledge in two learning directions gives some implications to the relations of explicit and implicit knowledge. That is, it is possible that in some conditions, such as when learners have high L2 proficiency, or when L1 and L2 cues are congruent, L2 learners' grammatical knowledge can be converted to the implicit knowledge, as what stated in weak interface account (e.g., R. Ellis, 2005). However, to test the relations of explicit and implicit knowledge, debriefing, which refers to a short interview after the experiment, is needed in future research.

To sum up, in this section, the theoretical implications of the current research were summarized from the perspectives of empirical support to the semantic finiteness, contributions to CLI in L2 acquisition and processing.

7.3 Limitations and Implications for Future Studies

The current research investigated how the cross-linguistic differences of finite and non-finite distinctions influence L2 acquisition and processing of MVCs from a bidirectional perspective. The limitations of methodology have been summarized in Chapter Four, Five and Six. That is, interlanguage corpus has the limitation of lack of interpretation of misuses; grammaticality judgment test usually has a small scale of data; and self-paced-reading tests are not as natural as the reading in real-life. To overcome the limitation of a separate research method, the current research employed all the above-mentioned methods. Considering that the grammaticality judgment test

is after a time-consuming self-paced-reading task, only part of the stimuli and fillers were chosen for the offline judgment. Thus, there was a relatively small number of test items in the GJ test.

In the qualitative bidirectional comparison, even though many variables, including the participants' age, education background, and L2 proficiency have been controlled, there are still some factors which cannot be controlled because of the education systems in the two countries.

One factor is that, Chinese ESL learners had no other language learning experiences except for English, while English CSL learners usually had learned other foreign languages such as French, Spanish (linguistically close to L1) before they began to learn Chinese. It is argued that the languages that English CSL learners had learned before they started Chinese learning are typologically close to their L1, and similarly as English, have morphological finiteness. Moreover, the participants' proficiency in earlier-learned foreign languages was reported to be low (see Chapter Six), it is, therefore, assumed that they have little effect on the acquisition of Chinese MVCs.

Another factor is the size of interlanguage corpora. The interlanguage corpora include more compositions of English as L2 learners than those of Chinese as L2 learners, because of the large population of Chinese and the lingua franca feature of English. Thus, a qualitative instead of quantitative comparison was given.

Finally, Odlin (2005) noted that in the field of cross-linguistic influence research, "several studies of various structures have offered especially convincing evidence of transfer because they employ a methodology where the learners studied do not all speak the same L1" (p.4). It is more convincing to have L2 learners from different L1

backgrounds in CLI research. The current research in each direction involved participants from one background. However, the four types of MVCs which had L1 and L2 contrast on both forms and syntax can serve as the baseline for each other. And the qualitative bidirectional comparison can also show a comprehensive view of CLI.

For the future research, a further step to the conceptual transfer based on the different interpretations of multiple verbs in English and Chinese may enhance our understanding of cross-linguistic influence. "In second language acquisition, there has long been an awareness of the possible significance of relativism" (Odlin, 2005, p. 9). That is a question about whether the thinking in L1 influences the speaking in the L2. Future research on whether the concept of serialization in Chinese is transferred to the non-serializing MVCs in English, and bidirectionally, if the concept of serialization can be constructed by English CSL learners may provide more information about the MVC acquistion in the L2.

8. Chapter Eight Conclusion

The present thesis investigated Chinese-English learners' production, explicit knowledge and online processing of multi-verb constructions in the L2. The aim was to explore the learnability problems that may arise because of differences in morphological finiteness in English and semantic finiteness in Chinese, in other words, how the cross-linguistic differences in the finite and non-finite distinctions in these two languages may influence the learners' production and their explicit and implicit knowledge.

As noted in Chapter One, the study of MVCs is important as the verb is the core of a sentence and multi-verbs are the reflection of some related events from the real world. Nikolaeva (2007) stressed that finiteness is the central element in theorizing about morpho-syntax. MVCs are typologically different and reflect a series of linguistic features.

In Chapter Two, finite and non-finite distinctions and MVCs in English and Chinese were introduced. English MVCs contain an inflectionally-marked finite verb combined with uninflected non-finite forms, Chinese MVCs contain two or more verb phrases or clauses, without any marker indicating what the relationship is between them. Given the differences at the morphological level between English and Chinese MVCs, a more abstract category of finite and non-finite distinction arises. Klein (1998, 2006, 2009) proposed the theory of semantic finiteness, and claimed that finiteness comprises assertion (AST) and topic time (TT). He argued that Chinese does not have tense, but the finiteness function can be expressed by aspect. According to this criterion, verbal subject and verbal object are classified as non-finite, while both verbs

in pivotal and serial-event sentences may convey aspectual information as a compound predicate.

In Chapter Three, theories in CLI, the relations between acquisition and processing, and different kinds of knowledge in L2 were discussed to provide a theoretical basis for the current study. Cross-linguistic differences can lead to learnability problems because of form-meaning mapping. Making form-meaning connections is also cognitively effortful, which is embodied in the selection of multiple cues in L2. Cue salience and L1 experience determine the learning of L2 cues and can lead to overshadowing, blocking, and transfer. To study the cross-linguistic influence comprehensively, I tapped into different kinds of knowledge concerning both performance and competence.

In Chapter Four, the research questions and methodology were set out. To answer the research questions, different kinds of research methods were employed, including large-scale learners' corpora, offline grammatical judgment test, and self-paced-reading tasks.

In Chapter Five, interlanguage corpora, grammaticality judgment, and self-paced-reading experiments were applied to investigate how cross-linguistic differences influence Chinese ESL learners' production, explicit and implicit knowledge. In the production of non-finite verbs, bare verbs and over-inflection were argued to be attributed to cross-linguistic influences as they were reminiscent with the Chinese MVCs in word-by-word translation, and the other two types of errors (*to-do* variants, and dedifferentiation) to developmental errors because of inadequate learning. Sentence types and L2 proficiency were all influential factors, as over-inflection mainly appeared in object complement and adverbial among low-proficiency learners,

reminiscent of the compound predicate in Chinese MVCs. It was thus argued that there were both morphological and morpho-syntactic transfer in Chinese ESL learners' production of English MVCs. To further interpret if the negative transfer in the production was due to the lack of explicit knowledge of finite and non-finite distinction, I designed the grammaticality judgment test. It was found that cross-linguistic difference did not have an impact on the learners' explicit knowledge. L2 proficiency was an influential factor in explicit knowledge: except in the sentences with non-finite verbs as adverbial, the higher the English proficiency, the lower the acceptability. In the corresponding online self-paced-reading tasks, Chinese ESL learners had significant differences with English native speakers in sentences with non-finite verbs as object complement and showed insensitivity to the over-inflection. It suggested the influence of the compound predicate in L1 and the lower-proficiency learners were less sensitive to the grammatical violation.

In Chapter Six, similar research methods were used for the test of English CSL learners' production, explicit and implicit knowledge. In HSK dynamic composition corpus, English CSL learners had only a few errors in using MVCs, which are aspectual morpheme "*le*" in wrong places and lexical collocations. The former indicated the syntactic transfer from L1. L2 proficiency played a role in the usage of MVCs: higher proficiency learners inclined to use more MVCs and aspectual markers. Grammaticality judgment task showed that in comparison with native Chinese speakers, English CSL learners had a significantly higher acceptance to the violated positions of the aspectual adverb in verb-subject or object sentences and regarded the first verb in the compound predicate in pivotal and serial-event sentences as the only finite verb. This suggested the lexical cue posed some difficulties for English CSL learners. The online self-paced-reading tasks showed that learners were less sensitive

to the position of "*yǐjīng*" (already) before the verb subject, but showed sensitivities in other sentence types. It was argued to be due to the competition between "*already*" in L1 with "*yǐjīng*" in L2.

In Chapter Seven, a general discussion was given on the basis of bidirectional comparisons. The findings have theoretical implications to the field of second language acquisition. It exposed the different CLI in different types of knowledge and the acquisition route and confirmed the dynamic competition models. This study provides evidence for the theoretical argument that finiteness exists in Chinese. It contributes to theories of second language acquisition by providing a bidirectional picture of cross-linguistic influence between typologically distant languages, combining acquisition and processing study, and exploring the methods of SPR in investigating complex Chinese sentences.

In sum, the present study probed into the grammatical property of finite and non-finite distinctions which are typologically different in English and Chinese, and it is the first attempt to research how the typological differences in [+-F] distinctions, which is essential to morphosyntactic construction, would influence the L2 acquisition and processing. The interlanguage, online and offline tasks showed some interesting results that the cross-linguistic influences exist in L2 production, explicit and implicit knowledge, but the influences occur to different degrees, and are in different forms, which depends on the learners' early experience in L1, the salience of cues in distinguishing finite and non-finite verbs, and the redundancy, optionality, opacity of the forms in meaning mapping. It thus provided evidence and examples in the CLI effects in L2 studies, contributed to the second language theories from the bidirectional perspectives and shed light to the further investigation in the typological studies in

finiteness and MVCs.

Appendices

Appendix 1: Consent Form in the English as L2 Studies

Participant Consent Form

What will be involved in participation?

I understand that:

- The purpose of the proposed study is to understand how second language learners process sentences in target language.
- The data collection will take about 30 minutes for me to complete.
- I will be asked to complete a self-paced reading task and other tasks.
- My performance in these activities will not have an impact on my grades and will not be communicated to any teachers in my university.
- I will receive rewards for participating in this study.

How will my data be handled?

I understand that:

My participation is voluntary, and I may withdraw myself and my data at anytime during the data collection by informing the researcher without any penalty being imposed on me.

- Only the Principal Investigator will have access to the data and information collected in this study before it is anonymized.
- The data and information collected during this study will be anonymized as soon as possible after collection.
- Any personal information required to link the data will be kept in a separate password protected file, to which only the Principal Investigator will have access.
- The anonymized data will be archived and may be used for other academic and research purposes by other researchers inside and outside the University.
- The anonymized data may be used publicly, e.g. in presentation or online.
- The anonymized data is likely to be kept for over 5 years for paper publishing purposes.
- The data will only be used for academic and research purposes.

I can withdraw my data within two weeks after participating in this study without any penalty being imposed on me.   I cannot withdraw my data two weeks after my participation in the study.

What should I do if I have questions or concerns?

I understand that:

- This project has been reviewed by and received ethics clearance through the ethics committee in the Department of Education at the University of York.
- If I have any questions about this research, I should in the first instance contact the Principal Investigator, Mengmeng Tang (mt954@york.ac.uk).
- If I have any concerns about the conduct of this research, I may contact the Chair of the Ethics Committee, Dr Emma Marsden (emma.marsden@york.ac.uk).

Name of participant _____   Date_____

    Signature_____

Name of researcher _____   Date_____

    Signature_____

Appendix 2: Background Language Questionnaire in the English as L2 Studies

Below you will find questions about your education, profession and most of all your language use (background). Please answer all these questions as completely as possible.

1. Name: _____

2. Sex: _____

3. Age: _____

4. What is your level of education (e.g. secondary school, university degree)? …………

5. What is your profession?……………………..

    a. Do you have a job? If yes, what kind?………………………..

6. Where were you born?…………………

7. What is/are your native language(s)? ……………...………….

8. What languages do you know and how good do you think you are? Sort these languages and put your best language on top in the first column. Give the level of each language by using the following scale:

    Not good 1   2   3   4   5   Very good

Language	Speaking	Listening	Writing	Reading	Grammar	Pronunciation
1:						
2:						
3:						
4:						
5:						

9. How old were you when you started to learn these languages (question 8) and where did you learn them? If you have had lessons (e.g. at school, courses, etc), for how many years did you take them? If you have not had formal instruction (e.g. if you learnt these languages at home, at work, on vacation, from friends, etc), for how many years have you been learning them?

Language	Age	Lessons	How long	Informal learning	How long
1:					
2:					
3:					
4:					
5:					

10. Have you ever lived in any other countries? If yes, how old were you when you arrived and how did you learn the language? If you had lessons (e.g. at school, courses etc), for how many years did you take them? What was the reason for your residence in that country (e.g. study, job, internship, vacation, family etc)?

Language	Country	Age	Lessons	How long	Reason for staying	How long
1:						

2:						
3:						
4:						
5:						

If you have other remarks concerning the languages you can speak, please use the blank space below.

....
....
....
....
....

Appendix 3: Oxford Placement Test

Oxford Placement Test 1 Grammar Test   Part 1

Name _____

Total Listening   ____/ 100   Total Grammar Part 2 ____ / 50

Total Grammar Part 1 ____/ 50 Grand total   ____/ 100

Look at these examples. The correct answer is ticked.

a   In warm climates people ✓ | like | | likes | | are liking | sitting outside in the sun.

b   If it is very hot, they sit ✓ | at | | in | | under | the shade.

Now the test will begin. Tick the correct answers.

1. Water | is to boil | | is boiling | | boils | at a temperature of 100° C.

2. In some countries | there is | | is | | it is | very hot all the time.

3. In cold countries people wear thick clothes | for keeping | | to keep | | for to keep | warm.

4. In England people are always talking about | a weather | | the weather | | weather | .

5. In some places | it rains | | there rains | | it raining | almost every day.

6. In deserts there isn't | the | | some | | any | grass.

7. Places near the Equator have | a warm | | the warm | | warm | weather even in cold season.

8. In England | coldest | | the coldest | | colder | time of year is usually from December to February.

9. | The most | | Most of | | Most | people do not know what it is like in other countries.

10. Very | less | | little | | few | people can travel abroad.

11. Mohammed Ali | has won | | won | | is winning | his first world title fight in 1960.

12. After he | had won | | have won | | was winning | an Olympic gold medal he became a professional boxer.

13. His religious beliefs | have made him | | made him to | | made him | change

his name when he became champion.

14. If he [**has**] [**would have**] [**had**] lost his first fight with Sonny Liston, no one would have been surprised.

15. He has travelled a lot [**both**] [**and**] [**or**] as a boxer and as a world-famous personality. He is very well known [**all in**] [**all over**] [**in all**] the world.

16. Many people [**is believing**] [**are believing**] [**believe**] he was the greatest boxer of all time.

17. To be the best [**from**] [**in**] [**of**] the world is not easy.

18. Like any top sportsman Ali [**had to**] [**must**] [**should**] train very hard.

19. Even though he has now lost his title, people [**would**] [**will**] [**did**] always remember him as a champion.

20. The history of [**aeroplane**] [**the aeroplane**] [**an aeroplane**] is

21. [**quite a**] [**a quite**] [**quite**] short one. For many centuries men

22. [**are trying**] [**try**] [**had tried**] to fly, but with

23. [**little**] [**few**] [**a little**] succes. In the 19th century a few people

24. succeded [**to fly**] [**in flying**] [**into flying**] in balloons. But it wasn't until

25. the beginning of [**this**] [**next**] [**that**] century that anybody

26. [**were**] [**is**] [**was**] able to fly in a machine

27. [**who**] [**which**] [**what**] was heavier than air, in other words, in

28. [**who**] [**which**] [**what**] we now call a 'plane. The first people to achieve 'powered flight' were the Wright brothers.

29. [**His**] [**Their**] [**Theirs**] was the machine which was the forerunner of the Jumbo jets

30. and supersonic airliners that are [**such**] [**such a**] [**so**] common

31. sight today. They [**could**] [**should**] [**couldn't**] hardly have imagined that in 1969,

32. [**not much**] [**not many**] [**no much**] more than half a century later,

33. a man [**will be**] [**had been**] [**would be**] landed on the moon.

34. Already [**a man**] [**man**] [**the man**] is taking the first steps towards the stars.

35. Although space satellites have existed [**since**] [**during**] [**for**] less

36. than forty years, we are now dependent [**from**] [**of**] [**on**] them for all

37. kinds of [**informations**] [**information**] [**an information**] . Not only

38. [**are they**] [**they are**] [**there are**] being used for scientific research in

39. space, but also to see what kind of weather [**is coming**] [**comes**] [**coming**] .

40. By 1998 there [**would**] [**must**] [**will**] have been satellites in space for forty

41. years and the 'space superpowers' are planning to [**have**] [**make**] [**let**]

42. massive space stations built. When these [**will be**] [**are**] [**will have been**]

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43. completed it will be the first time ☐ **when** ☐ **where** ☐ **that** astronauts will be

44. able to work in space in large numbers. ☐ **Apart** ☐ **For** ☐ **Except** all that,

45. in many ways the most remarkable flight ☐ **of** ☐ **above** ☐ **at** all was

46. ☐ **it** ☐ **that** ☐ **that one** of the flying bicycle, which the world saw on television,

47. ☐ **flying** ☐ **to fly** ☐ **fly** across the Channel from England to France, with nothing

48. ☐ **apart** ☐ **but** ☐ **than** a man to power it. As the bicycle-flyer said,

49. 'It is the first time ☐ **I realize** ☐ **I've realized** ☐ **lam realizing** what hard work it is to be a bird!'

Appendix 4: Grammaticality Judgement Test in English as L2 Studies

Grammatical Judgement Task

Read sentences and decide as quickly as you can, without thinking too much, whether you think the sentence is acceptable or not, on a scale from 1 (least acceptable) to 6 (most acceptable)

1	2	3	4	5	6

1. The wind blowed strongly yesterday. (   )
2. Emily lowered her head slightly concealed her emotion. (   )
3. The sister of the actress who shot herself on the balcony was under investigation. (   )
4. Brad aimed got the champion in the match. (   )
5. I tasted lots of different dishes in China. (   )
6. Jane said that had a kind-hearted neighbor was very important. (   )
7. The girl selled many flowers in the shop yesterday. (   )
8. Katherine permitted her daughter learned Kong Fu. (   )
9. Amy hiked a long way home last weekend. (   )
10. The workers elected that man spoke in public. (   )
11. The uncle of the fireman who criticized himself far too often was painting the bedroom. (   )
12. Charlie asked the waitress brought some tea. (   )
13. She pulled the kid out of the river the day before yesterday. (   )
14. Kitty felt that smoked cigarettes on the plane was very dangerous. (   )
15. They shaked hands with each other in the meeting last week. (   )
16. The government forbade the citizens entered the hall. (   )
17. The uncle of the policewoman who treated himself after the accident was watching the news. (   )
18. Mary admitted that grew roses in her garden was very exciting. (   )
19. Janet missed the bus this morning. (   )
20. Joy intended finished his homework in the morning. (   )
21. It rained heavily last night caused a flood. (   )
22. Those words hurted my heart last night. (   )
23. Dory attempted saved some money for the holiday. (   )

24. The mother of the bride who embarrassed herself at the reception was complaining to the priest. (   )

25. He sat in the armchair read the newspaper. (   )

26. We dated in the park last weekend. (   )

27. Professor Li mentioned that designed gardens for a city was very interesting. (   )

28. The boy digged a hole in the garden last week. (   )

29. Bob died a glorious death fought the robber. (   )

30. The nephew of the woman drowned himself in the ocean knew nothing about the tricky current. (   )

31. Peter borrowed some books from the library last weekend. (   )

32. Mike meant left the company in the afternoon. (   )

Appendix 5: Stimuli in SPR Study 1

Type 1 Non-finite Verbs as Subject:

1. She said/ that/ working/worked/ <u>in late night</u>/ <u>harmed</u>/ <u>her health</u>. She always works late.

    Does she often work early?   J

2. He knew/ that/ travelling/travelled/ <u>around the world</u>/ <u>became</u>/ <u>his hobby</u>. He always travels abroad.

    Does he always travel to other countries?   F

3. Chris thought/ that/ jogging/ jogged/ <u>in the forest</u>/<u>changed</u>/ <u>his personality</u>. He often jogs alone.

    Does he often jog with his friends? J

4. Jane said/ that/ writing/wrote/ <u>in spare time</u>/ <u>enriched</u>/ <u>her life</u>. Jane often writes articles.

    Does Jane often write articles? F

5. He mentioned/ that/ thinking/thought/ <u>in early morning</u>/ <u>improved</u>/ <u>his efficiency</u>. He works very hard.

    Does he work hard? F

6. Mary admitted/ that/ planting/planted/ <u>in the garden</u>/ <u>arose</u>/ <u>her interest</u>. She really likes plants.

    Does Mary hate plants? J

7. Kitty said/ that/ smoking/smoked/ <u>on the plane</u>/ <u>caused</u>/ <u>some troubles</u>. She smokes every day.

    Does Kitty often smoke? F

8. Mark said/ that/ swimming/swam/ <u>in the river</u>/ <u>trained</u>/ <u>his body</u>. He swims every day.

    Does Mark swim once a week? J

9. Christina said/ that/ standing/stood/ <u>on the stage</u>/ <u>made</u>/ <u>her nervous</u>. She is very shy.

    Is Christina shy? F

10. Cheng knew/ that/ studying/ studied/ in the university/broadened his horizon. He enjoys the life.

    Does he hate university? J

11. Betty said/ that/ living/lived/ <u>in the village</u>/ <u>healed</u>/ <u>her sadness</u>. She is happy now.

    Is she still sad now? J

12. James claimed/ that/ diving/dived/ in the summer made him excited. He dives every summer.

    Does James dive each summer? F

Type 2 Non-finite Verbs as Object Complement:

1. The boss/ forced/ the coach/ to leave/left/ <u>the team</u>/ <u>after the match</u>. The coach was very sad.

   Was the coach sad? F

2. The teacher/ allowed/ the students/ to go/went/ <u>back home</u>/ <u>after the meeting</u>. The students were quite happy.

   Were the students happy? F

3. Charlie/ asked/ the waitress/ to bring/brought/ <u>some tea</u>/ <u>to the table</u>. The waitress looked very unhappy.

   Did the waitress look happy? J

4. The government/ forbade/ the citizens/ to enter/entered/ <u>the hall</u>/ <u>after 5 o'clock</u>. The citizens were quite upset.

   Could citizens enter the hall after 5? J

5. Mary/ encouraged/ her sister/ to wash/washed/ <u>the clothes</u>/ <u>after the party</u>. Her sister was very unhappy.

   Was her sister pleased? J

6. Jane/ told/ her classmates/ to attend/attended/ <u>the party</u>/ <u>in the ballroom</u>. Her classmates were very excited.

   Did Jane invite her classmates? F

7. Katherine/ permitted/ her daughter/ to learn/learned/ <u>Kong Fu</u>/ <u>during the vacation</u>. Her daughter was very happy.

   Was her daughter happy? F

8. Tim / reminded/ that girl/ to bring/brought/ a camera/ <u>to the party</u>. That girl was very thankful.

   Was that girl thankful to Tim? F

9. The boss/ recommended/ his friend/ to lead/leaded/ <u>the staff</u>/ <u>in the company</u>. His friend was very amused.

   Was his friend sad with that? J

10. The workers/ elected/ that man/ to speak/spoke/ <u>in public</u>/ <u>in the hall</u>. That man was very shy.

    Was that man shy in public? F

11. Kate/ called/ her friend/ to help/helped/ <u>her sister</u>/ <u>with the work</u>. Her friend was very annoyed.

    Was her friend pleased? J

12. The company/ advised/ Uncle Wang /to visit/visited / <u>the factory</u>/ <u>in the suburb</u>. Uncle Wang was very excited.

    Was Uncle Wang sad? J

Type 3 Non-finite Verbs as Object:

1. Joy/ intended/ to finish/finished/ <u>his homework</u>/ <u>in the morning</u>. He felt it very easy.

   Did Joy think the homework difficult?   J

2. Mike/ meant/ to leave/left/ <u>the company</u>/ <u>in the afternoon</u>. He thought it very boring.

   Did Mike feel the job interesting? J

3. Brad/ aimed/ to get/got/ <u>the champion</u>/ <u>in the match</u>. He thought it very easy.

   Did Brad feel it difficult? J

4. Dory/ attempted/ to save/saved/ <u>some money</u>/ <u>for the holiday</u>. He felt it very hard.

   Did Dory think it very easy? J

5. The teacher/ decided/ to teach/taught/ <u>those students</u>/ <u>the last lesson</u>. He felt happy for that.

   Did the teacher feel glad? F

6. Lindsay/ prepared/ to attend/attended/ <u>the meeting</u>/ <u>in the afternoon</u>. She was excited for that.

   Was Lindsay annoyed by the meeting? J

7. Ella/   wanted/ to end/ended/ <u>the relation</u>/ <u>with her boyfriend</u>. She was upset for him.

   Was Ella satisfied her boyfriend? J

8. Bob/ tried/ to learn/learned/ <u>Kong Fu</u>/ <u>during the summer</u>. He thought it very interesting.

   Was Bob interested in Kong Fu? F

9. Jim/managed/ to cook/cooked/ <u>a meal</u>/ <u>all by himself</u>. He was pound of that.

   Was Jim proud of the meal? F

10. Nara/ desired/   to buy/bought/ <u>a bicycle</u>/ <u>of that brand</u>. She was attracted by it.

    Does Nara like bikes of that brand? F

11. Paul/ agreed/ to help/helped/ <u>his classmates</u>/ <u>with their homework</u>. They were all very happy.

    Were Paul's classmates happy? F

12. Tina/ promised/ to give/gave/ <u>her friend</u>/ <u>a nice present</u>. Her friend was very pleased.

    Was Tina's friend happy with the promise? F

Type 4 Non-finite Verbs as adverbial:

1. It/ rained/ in the night/ causing/caused/ <u>a flood</u>/ <u>in the downtown</u>. The flood was very severe.

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Did the flood happen in the downtown? F

2. He/ sat/ in the armchair/ writing/wrote/ a letter/to her mom. He missed her very much.

Did he miss his mom? F

3. Bob/ died/ a glorious death/ fighting/fought/ the robber/ in the street. The story was very moving.

Was the story touching? F

4. Emily/ lowered/ her head slightly/ to conceal/concealed/ her sadness/ in the classroom. She was in bad mood.

Was Emily happy? J

5. We/ jumped/ with great joy/ to hear/heard/ that news/ from the radio. That news was very encouraging.

Were we upset with that news? J

6. We/ went/ to the market/ to buy/bought/ some food/ for the guests. The market is very big.

Is the market a small one? J

7. The fire/ lasted/ for a month/ leaving/left/ nothing valuable/ in the city. The disaster was very terrible.

Was there anything valuable after the fire? J

8. Frank/ stood/ by the door/ looking/looked/ at her/ with a smile. He loved her very much.

Did Frank love her? F

9. He/ returned/ to his hometown/ to visit/visited/ his teacher/ in middle school. His teacher was very happy.

Was his teacher annoyed? J

10. We/ came/ back our home/ to search/searched/ those keys/ to the cabinet. We were in a hurry.

Did we come back to the office? J

11. She/ burst/ into loud laughers/ to see/saw/ his action/ in the movie. His action was very funny.

Did she laugh at his action? F

12. She/ caught/ a serious cold/ sitting/sat/ on stages/ in the night. The cold was very annoying.

Was she ill? F

Appendix 6: Consent Form in Chinese as L2 Studies

<p align="center">**知情同意书**</p>

测试内容是什么?

我明白：

● 研究目的是调查二语学习者加工汉语中的多动词结构的情况。

● 数据收集在 40-50 分钟左右。

● 我将做一个在线的自测步速阅读测试和其它笔答题。

● 我在本次实验中的表现不会影响我在学校各项考试中的分数。

● 我将会在实验后收到相应报酬。

实验数据将如何处理?

我明白：

● 我自愿参加本次实验，而且有权在实验中或实验后二周内撤回我的数据。

● 实验数据将会匿名处理，仅作研究使用。

● 数据可能保存长达五年，用于学术发表之用。

如有问题，应联系谁?

● 本次实验已经约克大学的知情委员会同意。

● 如果我对本次研究有任何问题，我可以联系实验负责人唐萌萌 （mt954@york.ac.uk）

● 如果我对本次实验进程又任何其它疑问，可以练习约克大学知情委员会主席 Emma Marsden 博士 （emma.marsden@york.ac.uk）

参与人：_____   日期：_____   签名：_____

研究人：_____   日期：_____   签名：_____

Appendix 7: Background Questionnaire in Chinese version

个人信息表格

请根据个人情况填写如下表格：

Please fill in the following blanks. You can fill them in Chinese or in English.

1. 姓名：_____

2. 年龄：_____

3. 性别：女 □   男 □

4. 国籍：_____

5. 学校：_____

6. 所学专业：_____

7. 母语：_____

8. 学习汉语的时间：_____

9. 若汉语水平从低到高划分为 1--6 级，您认为自己的汉语水平处于几级？请在相应等级下划√

(低)————————————————→ (高)

| 1 | 2 | 3 | 4 | 5 | 6 |
| □ | □ | □ | □ | □ | □ |

10. 是否参加过 HSK 测试？是 □   否 □

若参加过，请填写等级：_____

11. 您是否在中国待过 6 个月以上？是 □   否 □

若是， 请填写在中国待的时间：_____

13. 您是否学习过除汉语外的其它外语？是 □   否 □

若是，请填写哪种外语，水平如何？_____

谢谢您参加本次实验!

Appendix 8: Chinese Proficiency Test

请阅读以下段落，并选出正确答案。

1-2.

说话虽然是生活中最普通的事，却不简单，有许多地方值得注意：着急的事，要慢慢地说；别人的事，要小心地说；伤心的事，不要见人就说；讨厌的事，要对事不对人地说；现在的事，做了再说；以后的事，以后再说；而不能肯定的事、没发生过的事，千万不要乱说。

★ 遇到伤心的事，应该：

A 和同事说　　B 别到处说　　C 多和朋友说　　D 别让邻居知道

★ 将来的事，应该怎么说？

A 马上说　　　B 将来说　　　C 认真地说　　　D 积极地说

3-4.

如果你想减肥，那么必须做到两点：一是少吃东西，二是多运动。少吃不代表不吃，而是要科学地吃。关键是要多运动，但是也不需要每天都运动，一周运动两到三次，每次运动一个小时也就差不多了。骑自行车、打篮球、跑步等都是很好的减肥运动。要想减肥成功，一定要坚持，不能怕累，否则很难有效果。

★ 关于减肥，最重要的是：

A 多锻炼　　　B 有计划　　　C 每天都运动　　　D 不要有烦恼

★ 如果想减肥成功，一定要：

A 简单　　　　B 快乐　　　　C 坚持　　　　D 热闹

5-6.

很多人问哪个季节去丽江旅游比较好，总的来说，丽江一年四季人都不少，情况稍微好一点儿的时候是每年 12 月到第二年 3 月。这段时间来丽江的话，无论交通还是吃、住都是最便宜的。天气方面，这个时候比较冷，气温在-5℃到 18℃，早晚温差比较大。风景的话，主要是雪景，白天都是蓝天白云，照出的照片质量会非常高。

★ 去丽江旅游，什么时候比较好？

A 2月　　　　　B 6月　　　　　C 9月　　　　D 11月

　　★ 关于丽江，下列哪个正确?

　　A 交通不便　　B 游客很多　　C 少数民族多　　D 不适合照相

7-8.

　　每个人的生命中都会遇见一件重要的事情，那就是结婚，选择与自己爱的人在一起生活。在结婚之前，我们都要弄清楚自己想要的是什么，而不要被别人对幸福的看法影响，因为没有人能够代替你获得幸福，真正的幸福是你和你爱的人在一起，共同生活，并且从心底里感到幸福与快乐。

　　★ 结婚之前，我们应该:

　　A 休息好　　B 学会表达　　C 与父母商量　　D 知道自己要什么

　　★ 根据这段话，婚后幸福的条件是:

　　A 互相信任　　B 相互尊重　　C 有责任心　　D 找到你爱的人

9-11.

　　有一个年轻人在一家公司做得很出色，他为自己设计了一个美好的未来，对 9 充满信心。然而这家公司突然因为某些原因破产了，这位青年变得很悲观，认为自己是世界上最不幸、最 10 的人。但是他的经理，一位中年人拍了拍他的肩说：″你很幸运，小伙子。″″幸运?″青年人叫道。″对，很幸运! ″经理重复了一遍，他解释道：″凡是青年时期受过挫折的人都很幸运，因为你可以学到如何 11 。现在重新开始，一点儿都不晚。″

　　9．**A** 记忆　　**B** 前途　　**C** 命运　　**D** 价值
　　10．**A** 善良　　**B** 谨慎　　**C** 糟糕　　**D** 倒霉
　　11．**A** 坚强　　**B** 宝贵　　**C** 明显　　**D** 熟练

12-15.

　　乘坐电梯时，如果电梯突然停住了，也没有其他人发现电梯坏了，你应该怎么办? 首先不要 12 ，确定电梯是不是真的无法正常运行。然后，立刻按红色的电梯门铃，求救铃声一响，就会有 13 的救援人员来救你。同时，也可以大声地呼救，电梯外的人有可能会听到，帮助你脱离困境。千万不要 14 激动地用力拍打电梯门，那样的话，电梯很可能会

不正常地上升或下降，__15__。

12．**A** 委屈　　**B** 慌张　　**C** 沉默　　**D** 犹豫

13．**A** 完美　　**B** 时髦　　**C** 成熟　　**D** 专业

14．**A** 情绪　　**B** 心理　　**C** 逻辑　　**D** 思想

15．**A** 改变危险的状况　　　　　**B** 威胁到他人安全

　　　C 造成不必要的危险　　　　**D** 直到引起人们的注意

Appendix 9: Grammaticality Judgment Test in Chinese

语法接受度测试

按照句子的语法可接受程度，给下面句子标上等级。1 为句子最不可接受，6 为句子完全正确。

1	2	3	4	5	6

(不可接受）   （完全正确）

1. 我到达了一星期了。（   ）
2. 小王知道已经抽烟危害他的健康。（   ）
3. 法律存在了很多年了。（   ）
4. 小王已经打算访问中国。（   ）
5. 她刚获得了一块金牌。（   ）
6. 小王已经邀请小李观看比赛。（   ）
7. 小红刚感觉了非常孤独。（   ）
8. 小王已经烧水泡茶。（   ）
9. 手指破了刚一小时了。（   ）
10. 小王知道已经旅行成为他的爱好。（   ）
11. 小张刚讨厌了教务主任。（   ）
12. 小王规划已经成立公司。（   ）
13. 小红醒了刚一小时了。（   ）
14. 小王尝试已经创造机会。（   ）
15. 他说抓了一条鱼的那个男孩长的很高。（   ）
16. 小王安排小李已经办理业务。（   ）
17. 她说弹着钢琴曲的那个男孩是个孤儿。（   ）
18. 政府已经禁止市民进入大厅。（   ）
19. 他说写着一封信的那个学生学习很好。（   ）
20. 小王已经计划迎接小李。（   ）
21. 他说扫了会客厅的那个叔叔很爱劳动。（   ）
22. 小王低头已经看书。（   ）
23. 他说教了一节课他感觉心里非常充实。（   ）
24. 老师命令学生已经清理垃圾。（   ）

25. 他说喝着威士忌他觉得自己有点头晕。（　　　）

26. 小王知道上网已经伤害他的眼睛。（　　　）

27. 他说漆了一扇门他觉得自己非常能干。（　　　）

28. 小王已经花钱买书。（　　　）

29. 他说建着节能楼他觉得自己特别高兴。（　　　）

30. 小王出门已经开会。（　　　）

31. 爸爸修了刚就摩托车。（　　　）

32. 小王知道跑步已经改变他的性格。（　　　）

33. 小吴旅行了刚十多天了。（　　　）

34. 小王逼了小明辞职。（　　　）

35. 小狗消失了刚一星期了。（　　　）

36. 小王逼小明辞了职。（　　　）

37. 女孩刚恨了她的妈妈。（　　　）

38. 小王启程了去美国。（　　　）

39. 男孩刚喜爱了这一副画。（　　　）

40. 小王启程去了美国。（　　　）

Appendix 10: Key words in the Chinese SRP Stimuli

Group 1:

Number   Frequency   words   grades

1. 237 弯 腰　　□　（二）
2. 439 跑 步　　□　（二）
3. 827 梦 想　　□　（二）
4. 1128 打 扫　　□　（二）
5. 1218 更 换　　□　（二）
6. 1509 聚 会　　□　（二）
7. 1854 伤 害　　□　（二）
8. 2093 说 服　　□　（二）
9. 2123 尝 试　　□　（二）
10. 4218 垃 圾　　□　（二）
11. 6201 命 令　　□　（二）
12. 6779 禁 止　　□　（二）

13. 7139 损 害　□　（二）
14. 8548 清 理　□　（二）
15. 10658 拒 绝　□　（二）
16. 11002 购 买　□（二）
17. 12836 允 许　□　（二）
18. 16224 鼓 励　□　（二）
19. 20649 规 划　□　（二）
20. 20562 业 务　□　（二）
21. 21473 邀 请　□　（二）
22. 烧　□　（二）
23. 泡　□（二）
24. 厅　□（二）

Group 2:

25. 234 开 机　□　（一　）
26. 570 抽 烟　□　（一　）
27. 807 跳 高　□　（一　）
28. 1241 出 门　□　（一　）
29. 3592 创 业　□　（一　）
30. 4056 性 格　□　（一　）
31. 4512 出 国　□　（一　）
32. 5579 观 看　□　（一　）
33. 7148 危 害　□　（一　）
34. 7306 办 理　□(一　)
35. 7454 迎 接　□(一　)
36. 10067 接 待　□(一　)
37. 18699 选 举　□　（一　）

38. 26259 安 排　□　（一　）
39. 27537 现 象　□　（一　）
40. 29868 准 备　□　（一　）
41. 33619 创 造　□　（一　）
42. 36380 保 证　□　（一　）
43. 39831 成 立　□　（一　）
44. 43184 艺 术　□　（一　）
45. 53925 作 为　□　（一　）
46. 61406 增 长　□　（一　）
47. 68155 访 问　□　（一　）
48. 75990 报 道　□　（一　）
49. 140866 会 议　□　（一　）
50. 迎 48146　（一　）

Group 3:

51. 599 跳 舞　□(一　)
52. 600 低 头　□　（一　一　）

53. 912 过 年　□　（一　）
54. 1763 礼 物　□　（一　）
55. 2160 班 长　□　（一　）

56．2164 答 应 □（一　　）

57．3049 花 钱　□（一　一　　）

58．3207 请 求　（一　　）

59．3209 旅 行　□（一　　）

60．4744 打 算　□（一　　）

61．4803 爱 好　□（一

62．6029 眼 睛　□（一　　）

63．6073 读 书　□（一　　）

64．7236 照 顾　□（一

65．8439 习 惯　□(一　　)

66．9059 节 目　□(一　　)

67．10476 客 人　□(一　　)

68．11326 机 会　□（一　　）

69．11535 表 演　□（一　　）

70．12572 变 成　□（一　　）

71．12985 选 择　□（一　　）

72．14038 通 知　□（一　　）

73．17633 健 康　□（一　　）

74．28228 知 识 □（一　　）

75．28627 进 入 □（一　　）

76．31678 改 变 □（一　　）

77．40656 建 议 □（一　　）

78．45917 比 赛 □（一　　）

79．54667 影 响 □（一　　）

80．55271 成 为 □（一　　）

81．58965 支 持 □（一　　）

82．73022 决 定 □（一　　）

83．83822 计 划 □（一　　）

84．99276 参 加 □（一　　）

85．102125 公 司□（一　　）

86．103035 要 求□（一　　）

87．客 □(一　　)

88．灯 □(一　　)

89．鞋 □(一　　)

90．接 □(一　　)

Group 4：

91．785 唱 歌　□（一　　）

92．2047 汉 语　□（一　　）

93．2183 房 间　□（一　　）

94．4172 电 脑　□（一　　）

95．5071 回 家　□（一　　）

96．5944 开 会　□（一　　）

97．97291 生 活□(一　　)

98．14838 同 意　□（一　　）

99．33442 大 家　□（一　　）

100．39505 帮 助□（一　　）

101．64433 学 习　□（一　　）

102．388955 中 国　　□(一　)

103．上 网　□(一　)

104．42429 买 □(一　)

105．199991 书 □(一　)

106．看 □(一　)

107．洗 □(一　)

108．菜 □(一　)

109．做 □(一　)

110．饭 □(一　)

111．水 □(一　)

112．提 □(一　)

113．车 □(一　)

114．找 □(一　)

115．听 □(一　)

116．茶 □（一　）

Appendix 11: Stimuli in Chinese SPR experiment

Sentence Type 1: verbs as subject

1. 他 知 道 抽 烟 已 经/ 已 经 抽 烟 危 害 他 的 健 康。他 还 抽 烟。

(he know smoke already/ already smoke harm his health. He still smoke.)

2. 她 知 道 上 网 已 经/ 已 经 上 网 伤 害 她 的 眼 睛。她 还 上 网。

(She know surf on net already/ already surf on net harm her eyes. She still surf on net.)

3. 他 知 道 旅 行 已 经/ 已 经 旅 行 成 为 他 的 爱 好。他 常 旅 行。

(He know travel already/ already travel be his hobby. He often travel.)

4. 他 知 道 跑 步 已 经/ 已 经 跑 步 改 变 他 的 性 格。他 常 跑 步。

(He know jog already/ already jog change his personality. He often jog.)

5. 他 知 道 出 国 已 经/ 已 经 出 国 成 为 一 种 现 象。他 常 出 国。

(he know go abroad already/ already go abroad be a phenomenon. He often go abroad.)

6. 他 知 道 读 书 已 经/ 已 经 读 书 增 长 他 的 知 识。他 常 读 书。

(he know read already/ already read enrich his knowledge. He often read.)

7. 他 知 道 听 歌 已 经/ 已 经 听 歌 成 为 他 的 爱 好。他 常 听 歌。

(he know listen songs already/ already listen songs become his hobby. He often listen songs.)

8. 他 知 道 跳 舞 已 经/ 已 经 跳 舞 影 响 他 的 学 习。他 常 跳 舞。

(he know dance already/ already dance influence his study. he often dance.)

9. 他 知 道 唱 歌 已 经/ 已 经 唱 歌 变 成 他 的 梦 想。他 常 唱 歌。

(he know sing already/ already sing become his dream. He often sing.)

10. 他 知 道 创 业 已 经/ 已 经 创 业 改 变 他 的 生 活。他 很 高 兴。

(he know set up a business already/ already set up a business alter his life. He very happy.)

11. 他 知 道 学 习 已 经/ 已 经 学 习 成 为 他 的 习 惯。他 很 努 力。

(he know study already/ already study become his habbit. He very hard.)

12. 他 知 道 跳 高 已 经/ 已 经 跳 高 损 害 他 的 膝 盖。他 常 跳 高。

(he know jump high already/ already jump high damage his knees. He often jump high.)

Sentence Type 2: verbs as object

1. 小 王 已 经 打 算/ 打 算 已 经 访 问 中 国 北 京。小 王 非 常 兴 奋。

(xiaowang already intend/ intend already visit China Beijing. xiaowang very excited.)

2. 小 王 已 经 规 划/ 规 划 已 经 成 立 新 的 公 司。小 王 非 常 兴 奋。

   (xiaowang already revolve/ revolve already set up new company. Xiaowang very exicted.)

3. 小 王 已 经 计 划/ 计 划 已 经 迎 接 新 的 员 工。员 工 非 常 高 兴。

   (xiaowang already plan/ plan already welcome new staff. staff very happy.)

4. 小 王 已 经 尝 试/ 尝 试 已 经 创 造 更 多 机 会。机 会 非 常 难 得。

(xiaowang already try/ try already create more chance. Chance very rare.)

5. 小 王 已 经 决 定/ 决 定 已 经 接 待 远 方 客 人。小 王 非 常 热 情。
(xiaowang already decide/ decide already treat faraway friend. Xiaomin g very friendly.)

6. 小 王 已 经 准 备/ 准 备 已 经 参 加 学 术 会 议。小 王 非 常 激 动。
(xiaowang already prepare/ prepare already attend academic meeting. Xiaowang very exicted.)

7. 小 王 已 经 尝 试/ 尝 试 已 经 学 习 一 门 外 语。外 语 非 常 难 学。
(xiaowang already try/ try already learn a foreign language. Foreign language very difficult.)

8. 小 王 已 经 同 意/ 同 意 已 经 帮 助 小 李 同 学。小 李 非 常 高 兴。
(xiaowang already agree/ agree already help xiaoli classmate. Xiaoli very happy.)

9. 小 王 已 经 答 应/ 答 应 已 经 购 买 新 年 礼 物。小 王 非 常 热 心。
(xiaowang already admit/ admit already buy new year gift. Xiao wang very nice.)

10. 小 王 已 经 保 证/ 保 证 已 经 照 顾 小 李 同 学。小 李 非 常 开 心。
(xiaowang already promise/ promise already look after xiaoli classmate. Xiaoli very happy.)

11. 小 王 已 经 拒 绝/ 拒 绝 已 经 帮 助 小 张 同 学。小 张 非 常 伤 心。
(xiaowang already refuse/ refuse already help xiaozhang classmate. Xiaozhang very sad.)

12. 小 王 已 经 选 择/ 选 择 已 经 支 持 红 色 方 队。红 队 非 常 厉 害。
(xiaowang already choose/choose already support red team. Red team very competitive.)

Sentence Type 3: pivotal sentence

1. 小 王 已 经 邀 请 小 李/ 邀 请 小 李 已 经 观 看 足 球 比 赛。小 李 非 常 开 心。

(Xiaowang already invite xiaoli/ invite xiaoli already watch football match. Xiaoli very happy.)

2. 小 王 已 经 安 排 小 李/ 安 排 小 李 已 经 办 理 新 的 业 务。小 李 非 常 担 心。

(Xiaowang already arrange xiaoli/ arrange xiaoli already go through new procedure. Xiaoli very worried.)

3. 政 府 已 经 禁 止 市 民/ 禁 止 市 民 已 经 进 入 政 府 大 厅。市 民 非 常 生 气。

(Government already forbid citizen/ forbid citizen already enter government hall. Citizen very angry.)

4. 老 师 已 经 命 令 学 生/ 命 令 学 生 已 经 清 理 墙 角 垃 圾。教 室 非 常 的 臭。

(Teacher already order student/ order student already tidy up corner rubbish. Classroom very smelly.)

5. 爸 爸 已 经 鼓 励 儿 子/ 鼓 励 儿 子 已 经　参 加 足 球 比 赛。比 赛 非 常 激 烈。

(Dad already encourage son/ encourage son already join football match. Match very fierce.)

6. 小 王 已 经 通 知 小 李/ 通 知 小 李 已 经　参 加 新 年 聚 会。小 李 非 常 开 心。

(Xiaowang already inform xiaoli/ inform xiaoli already join new year party. Xiaoli very happy.)

7. 妈妈已经允许女儿/ 允许女儿已经学习一门外语。女儿非常高兴。

(Mom already permit daughter/ permit daughter already learn a foreign language. Daughter very happy.)

8. 大家已经选举小马/ 选举小马已经作为一班班长。小马非常兴奋。

(People already choose xiaoma/ choose xiaoma already be class1 monitor. Xiaoma very excited.)

9. 大家已经请求记者/ 请求记者已经报道这个事件。大家非常开心。

(People already require journalist/ require journalist already report this issue. People very happy.)

10. 小王已经建议我们/ 建议我们已经更换旧的电脑。小王非常热心。

(Xiaowang already advise we/ advise we already change old computer. Xiaowang very warm-hearted.)

11. 大家已经说服小红/ 说服小红已经表演一个节目。小红非常害羞。

(People already persuade xiaohong/ persuade xiaohong already do a performance. Xiaohong very shy.)

12. 妈妈已经要求小红/ 要求小红已经打扫房间卫生。小红非常生气。

(Mom already ask xiaohong/ ask xiaohong already clean room. Xiaohong very angry.)

Sentence Type 4: verbs in series sentences

1. 小王已经烧水/ 烧水已经泡新买的绿茶。小王很爱喝茶。
(xiaowang already boil water/ boil water already make new gree tea. Xiaowang very love drink tea.)

2. 小王已经低头/ 低头已经看新买的小说。小王不爱聊天。
(xiaowang already lower head/ lower head already read new novel. Xiaowang not like chat.)

3. 小王已经花钱/ 花钱已经买那一套衣服。衣服可不便宜。
(xiaowang already spend money/ spend money already buy that clothes. Clothes not cheap.)

4. 小王已经出门/ 出门已经开重要的会议。小王非常兴奋。
(xiaowang already go out/ go out already have important meeting. Xiaowang very excited.)

5. 小王已经开门/ 开门已经迎新来的朋友。小王非常好客。
(xiaowang already open door/ open door already welcome new friend. Xiaowang very friendly.)

6. 小王已经开灯/ 开灯已经看新买的小说。屋里非常明亮。
(xiaowang already turn on light/ turn on light already read newly-bought novel. Room very bright.)

7. 小王已经洗菜/ 洗菜已经做全家人的饭。小王非常饿了。
(xiaowang already wash vegetable/ wash vegetable already cook whole family dinner. Xiaowang very hungry.

8. 小 王 已 经 回 家/ 回 家 已 经 看 生 病 的 妈 妈。小 王 非 常 着 急。
(xiaowang already go home/ go home already visit ill mom. Xiaowang very worried.)

9. 小 王 已 经 开 机/ 开 机 已 经 玩 新 出 的 游 戏。小 王 非 常 兴 奋。
(xiaowang already start computer/ start computer already play new game. Xiaowang very excited.)

10. 小 王 已 经 弯 腰/ 弯 腰 已 经 拣 地 上 的 钱 包。钱 包 可 不 便 宜。
(xiaowang already bend down/ bend down already pick up on floor purse. Purse not cheap.)

11. 小 王 已 经 接 水/ 接 水 已 经 洗 新 买 的 衣 服。小 王 非 常 勤 快。
(xiaowang already get water/ get water already wash new clothes. Xiaowang very diligent.)

12. 小 王 已 经 出 门/ 出 门 已 经 找 掉 了 的 钱 包。小 王 非 常 着 急。
(xiaowang already go out/ go out already find lost purse. Xiaowang very worried.)

List of Abbreviations and Symbols

*	ungrammatical example
?	questionable example
ASP	aspect
ASPA	aspectual adverbs
ASPM	aspectual particles
CLI	cross-linguistic influence
CRS	currently relevant state (*le*)
CSL	Chinese as second language
DE	associative; genitive; nominalizer (*-de*)
DUR	durative aspect (*-zhe*, *zai*)
EXP	experiential aspect (*-guo*)
ESL	English as second language
[+F]	finite
[-F]	non-finite
[+-F]	[+-finite]
GJ	Grammaticality Judgment
HSK	Hanyu Shuiping Kaoshi [Chinese Proficiency Test]
INFL	inflection
L2	second language
MVCs	Multiple-Verb Constructions
OPT	Oxford Placement Test
*P	p value < .05
PFV	perfective aspect (*-le*)

RT	response time
SPR	self-paced-reading
SVCs	Serial-Verb Constructions
V_1	verb 1
V_2	verb 2

References

Aikhenvald, A. (2006). Serial verb construction in a typological perspective. In A. Aikhenvald & R. M. W. Dixon (Eds.), *Serial Verb Constructions: a cross-linguistic typology cross-linguistic typology* (pp. 1–68). Oxford: Oxford University Press.

Aikhenvald, A. Y., & Muysken, P. C. (2011). *Multi-verb Constructions: a view from the Americas. Brill's Studies in the Indigenous Languages of the Americas, 3*. Brill, Leiden, The Netherlands.

Allan, D. (1992). *Oxford Placement Test*. Oxford: Oxford University Press.

An, L., & Liu, L. (2004). The contrastive study of the verbs in English SVOC structure and Chinese "jianyu" structure. *Yanbian Daxue Xuebao (Shehui Kexue Ban) [Journal of Yanbian University (Social Science)]*, *37*(2), 90–93.

Aoyama, K., Flege, J., Guron, S., Akahane-Yamada, R., & Yamada, T. (2004). Perceived phonetic dissimilarity and L2 speech learning: The case of Japanese /r/ and English /l/ and /r/. *Journal of Phonetics*, *32*, 233–250.

Arabski, J., & Wojtaszek, A. (2016). Contemporary perspectives on crosslinguistic influence. In R. A. Alonso (Ed.), *Crosslinguistic Influence in Second Language Acquisition*. Bristol; Buffalo: Multilingual Matters.

Bates, D., Mächler, M., & Bolker, B. (2012). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *55*, 1–9.

Becker, A. (2005). The semantic knowledge base for the acquisition of negation and teh acquisition of finiteness. In H. Hendriks (Ed.), *The Structure of Learner Varieties* (pp. 263–314). Berlin, New York: Mouton de Gruyter.

Benson, C. (2002). Transfer / Cross-linguistic influence. *ELT Journal*, *56*(January), 68–70.

Bley-Vroman, R. (1986). Hypothesis testing in second-language acquisition theory. *Language Learning*, *36*(3), 353–376.

Bliss, H. (2006). L2 acquisition of inflectional morphology: Phonological and

morphological transfer effects. In M. G. O'Brien, C. Shea, & J. Archibald (Eds.), *Proceedings of the 8th Generative Approaches to Second Language Acquisition Conference (GASLA 2006)* (pp. 1–8). Somerville, MA: Cascadilla Proceedings Project.

Bruhn de Garavito, J. (2011). Subject/object asymmetries in the grammar of bilingual and monolingual Spanish speakers: Evidence against connectionism. *Linguistic Approaches to Bilingualism*, *1*, 111–148.

Cambridge Online Dictionary. (2008). Retrieved from http://dictionary.cambridge.org/

Campos, G. (2009). L2 production of English past morphology in advanced Spanish natives : Syntactic deficits or phonotactic transfer? In Melissa Bowles et al. (Ed.), *Proceedings of the 10th Generative Approaches to Second Language Acquisition Conference (GASLA 2009)* (pp. 210–219). Somerville, MA: Cascadilla Proceedings Project.

Carroll, S. (2001). *Input and evidence: The raw material of second language acquisition*. Amsterdam: John Benjamins.

Chalker, S., & Weiner, E. (1994). *The Oxford Dictionary of English Grammar*. Oxford, New York: Oxford University Press.

Chan, Y. (2004). Syntactic transfer evidence from the interlanguage of Hongkong Chinese ESL learners. *The Modern Language Journal*, *88*(1), 56–74.

Chang, H. (2005). Missing inflections and impairment of interlanguage grammar. *Modern Foreign Language*, *28*(1), 61–71.

China Ministry of Education. (2004). *National Full-time Senior High School English Syllabus (Revised)*. People's Education Press.

Clahsen, H., & Felser, C. (2006). Grammatical processing in language learners. *Applied Psycholinguistics*, *27*, 3–42.

Committee of Foreign Language Teaching in Colleges and Universities. (2000). *English Syllabus for English Major in Colleges and Universities*. Foreign Language Teaching and Researching Press.

Cui, X. (2006). HSK Dongtai Zuowen Yuliao Ku [HSK Dynamic Composition Corpus]. Retrieved from http://202.112.195.192:8060/hsk/index.asp%0A

Cui, Y. (2013). L2 processing of relative clauses in Mandarin. *Arizona Working Papers in SLA & Teaching*, *20*, 20–39. Retrieved from http://slat.arizona.edu/arizona-working-papers-second-language-acquisition-teaching

Curme, G. O. (1931). *Syntax: A Grammar of the English Language*. Boston: D.C. Heath.

Dahl, O. (1985). *Tense and Aspect Systems*. Basil Blackwell Ltd.

DeKeyser, R. (1998). Beyond focus on form: Cognitive perspectives on learning and practicing second language grammar. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 42–63). Cambrige, UK：Cambridge University Press.

DeKeyser, R. M. (2000). The robustness of critical period effects in second language acquisition. *Studies in Second Language Acquisition*, *22*, 499–533.

DeKeyser, R. M. (2005). What makes learning second-language grammar difficult? A review of issues. *Language Learning*, *55*(S1), 1–25.

Dekydtspotter, L., & Renaud, C. (2014). On second language processing and grammatical development: The parser in second language acquisition. *Linguistic Approaches to Bilingualism*, *4*, 131–165.

Ellis, N. C. (2006). Selective attention and transfer phenomena in L2 acquisition: Contingency, cue competition, salience, interference, overshadowing, blocking, and perceptual learning. *Applied Linguistics*, *27*(2), 164–194.

Ellis, N. C. (2007). Blocking and learned attention in language acquisition. In *ConSci 2007,Proceedings of the Twenty-Ninth Cognitive Science Conference* (pp. 965–970). Nashville, TN.

Ellis, N. C., & Sagarra, N. (2010). Learned attention effects in L2 temporal reference: The first hour and the next eight semesters. *Language Learning*, *60*(2), 85–108.

Ellis, R. (1993). The structural syllabus and second language acquisition. *TESOL Quarterly*, *27*(1), 91.

Ellis, R. (2005). Measuring implicit and explicit knowledge of a second language: A Psychometric Study. *Studies in Second Language Acquisition*, *27*(2), 141–172.

Erbaugh, M. (1978). Acquisition of temporal and aspectual distinctions in Mandarin. *Papers and Reports on Child Language Development*, *15*, 30–37.

Erbaugh, M. (1992). The acquisition of Mandarin. In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition (Vol. 3)* (pp. 373–455). Hillsdale, NJ: Erlbaum.

Falk, Y., & Bardel, C. (2011). Object pronouns in German L3 syntax: Evidence for the L2 status factor. *Second Language Research*, *27*, 59–82.

Fang, G. (1939). *Tixi Yu Fangfa—Zhongguo Wenfa Gexin Luncong [System and Methods—Chinese Grammar Revolution Paper Colletion]*. Zhonghua Shuju [Chinese Press].

Fang, H., & Zhao, X. (2008). On the "Infinitive" structure in Chinese from the perspective of nominal clause. *Chinese Linguistics*, *2*(22), 23–95.

Fang, X. (2014). *A Corpus-based Study on Lexical and Grammatical Features in Chinese EFL Learners' Use of verbal "Non-finite Clauses."* Shanghai International Studies University, Shanghai.

Felser, C., Roberts, L., Marinis, T., & Gross, R. (2003). The processing of ambiguous sentences by first and second language learners of English. *Applied Psycholinguistics*, *24*(3), 453–489.

Ferreira, F., & Clifton, C., J. (1986). The independence of syntactic processing. *Journal of Memory and Language*, *25*(3), 348 – 368.

Fine, A. B., Jaeger, T. F., Farmer, T. A., & Qian, T. (2013). Rapid expectation adaptation during syntactic comprehension. *PloS One*, *8*(10), 1–18.

Finiteness. (n.d.-a). Finiteness. In *Online British Dictionary*. Retrieved from http://dictionary.reference.com/browse/finiteness

Finiteness. (n.d.-b). Finiteness. In *The Free Dictionary*. Retrieved from

http://www.thefreedictionary.com/Finiteness

Flege, J., & MacKay, I. (2004). Perceiving vowels in a second language. *Studies in Second Language Acquisition*, *26*, 1–34.

Fodor, J. D. (1998). Learning to parse? *Journal of Psycholinguistic Research*, *27*, 85–319.

Gilquin, G., & Gries, S. T. (2009). Corpora and experimental methods: A state-of-the-art review. *Corpus Linguistics and Linguistic Theory*, *5*(1), 1–26.

Gisborne, N. (2009). Aspects of the morphosyntactic typology of Hong Kong English. *English World-Wide*, *30*(2), 149–169.

Granger, S. (2002). A bird's eye view of learner corpus research. In S. Granger, J. Hung, & S.Petch-Tyson (Eds.), *Computer Learner Corpora, Second Language Acquisition and Foreign Language Teaching,* (pp. 3–33). Amsterdam: John Benjamins.

Green, C. (1996). The origins and effects of topic-prominence in Chinese-English interlanguage. *International Review of Applied Linguistics in Language Teaching*, *34*(2), 119–134.

Gu, Y. (2007). Theories of tense and aspect,and temporal reference in Chinese. *Language Science*, *6*(4), 22–38.

Gui, S., & Yang, H. (2003). *Chinese Learners' English Corpous*. Shanghai: Shanghai Foreign Language Education Press.

Guo, J. (2012). A study on the attenuation of finiteness of clauses in Mandarin Chinese. *Applied Linguistics*, *1*.

Hanban. (n.d.). Official HSK Center Introduction. Retrieved from http://www.chinesetest.cn/gosign.do?lid=0#

HanBan. (2010). *The Graded Chinese Syllables, Characters and Words for the Application of Teaching Chinese to the Speakers of Other Languages (National Standard: Application and Interpretation)*. Beijing: Beijing Language and Culture University Press.

Hawkins, R., & Liszka, S. (2003). Locating the source of defective past tense

marking in advanced L2 English speakers. In H. A. R. van Hout, F. Kuiken, & R. Towell (Eds.), *The Interface Between Syntax and Lexicon in Second Language Acquisition* (pp. 21–44). Amsterdam: John Benjamins.

Helms-Park, R. (2001). Evidence of lexical transfer in causative serial verbs. *Studies of Second Language Acquisition*, *23*, 71–102.

Helms-Park, R. (2003). Transfer in SLA and Creoles. *Studies on Second Language Acquisition*, *25*, 211–244.

Her, O.-S. (2008). *Grammatical Functions and Verb Subcategorization in Mandarin Chinese*. Taipei: Crane.

Hertel, T. (2003). Lexical and discourse factors in the L2 acquisition of Spanish word order. *Second Language Research*, *19*, 273–304.

Heydari, P., & Bagheri, M. S. (2012). Error analysis: Sources of L2 learners' errors. *Theory and Practice in Language Studies*, *2*(8), 1583–1589.

Higher Education Department of the Ministry of Education. (2006). *College English Band 4 Examinations (2006 Revised Edition)*. People's Education Press.

Hu, J. (1997). A comparative study of the classification, distribution and reference of empty categories in English and Chinese. *Foreign Language*, *5*, 38–44.

Hu, J., Pan, H., & Xu, L. (2001). Is there a finite vs. nonfinite distinction in Chinese? *Linguistics*, *39*(6), 1117–1148.

Hua, X. (2009). Hanguo liuxuesheng xide jieci gei de pianwu fenxi ji jiaoxue duice [The error analysis of Korean students' acquisition of the preposition Gei and the corresponding teaching strategies]. *Journal of the College of Chinese Language and Culture of Jinan University*, *1*, 24–29.

Huang, C.-T. J. (1982). Move wh in a language without wh-movement. *The Linguistic Review*, *1*, 369–416.

Huang, C.-T. J. (1989). Pro-drop in Chinese: A generalized control theory. In O. Jaeggli & K. Safir (Eds.), *The Null Subject Parameter* (pp. 185–214). Dordrecht: Kluwer.

Huang, Y. (1992). Against Chomsky's typology of empty categories. *Journal of*

Pragmatics, *17*, 1–29.

Huang, Y. (1994). *The Syntax and Pragmatics of Anaphora: A Study with Special Reference to Chinese*. Cambridge: Cambridge University Press.

Huang, Y. (2000). *Anaphora: A Cross-linguistic Approach*. Oxford: Oxford University Press.

Huang, Y., & Yang, S. (2004). L2 acquisition study of Chinese ba-structure (in Chinese). *Shijie Hanyu Jiaoxue (World Chinese Teaching)*, *1*, 49–59.

Hulstijn, J. (2002). Towards a unified account of the representation, processing and acquisition of second language knowledge. *Second Language Research*, *18*(3), 193–223.

Ionin, T., Montrul, S., & Caece, U. (2013). A bidirectional study on the acquistion of plural noun phrase interpretation in English and Spanish. *Applied Psycholinguistics*, *34*, 483–518.

Ionin, T., & Zyzik, E. (2014). Judgment and interpretation tasks in second language research. *Annual Review of Applied Linguistics*, *34*, 37–64.

Jarvis, S., & Pavlenko, A. (2008). *Crosslinguistic Influence in Language and Cognition*. London: Routledge.

Jegerski, J. (2014). Self-paced reading. In J. Jegerski & B. VanPatten (Eds.), *Research methods in second language psycholinguistics* (pp. 20–49). New York: Routledge.

Jegerski, J., & VanPatten, B. (2014). *Research Methods in Second Language Psycholinguistics*. New York/ Oxon: Routledge.

Jiang, N. (2004). Morphological insensitivity in second language processing. *Applied Psycholinguistics*, *25*, 603–634.

Jiang, N., Novokshanova, E., Masuda, K., & Wang, X. (2011). Morphological congruency and the acquisition of L2 morphemes. *Language Learning*, *61*(3), 940–967.

Jin, H. (1994). Topic-prominence and subject-prominence in L2 acquisition: Evidence of English-to-Chinese typological transfer. *Language Learning*, *44*,

101–122.

Jin, L. (2009). *The development of aspect marking in L2 Chinese by English native speakers*. Beijing: Foreign Language Teaching and Research Press.

Johnson, J. S., & Newport, E. L. (1989). Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology*, *20*, 60–99.

Juffs, A. (2005). The influence of first language on the processing of wh-movement in English as a second language. *Second Language Research*, *21*(2), 121–151.

Jung, E. H. (2004). Topic and subject prominence in interlanguage development. *Language Learning*, *54*(4), 713–738.

Just, M. A., Carpenter, P. A., & Wooley, J. D. (1982). Paradigms and processes in reading comprehension. *Journal of Experimental Psychology: General*, *111*(2), 228–238.

Klein, W. (1998). Assertion and finiteness. *Issues in the Theory of Language Acquisition: Essays in Honor of Jurgen Weissenborn*, 225–245.

Klein, W. (2006). On Finiteness. In *Semantics in acquisition* (pp. 245–272). Springer Netherlands.

Klein, W. (2009). Finiteness, universal grammar, and the language faculty. *Crosslinguistic Approaches to the Psychology of Language: Research in the Tradition of Dan Isaac Slobin*, 333–344.

Klein, W., Li, P., & Hendriks, H. (2000). Aspect and assertion in Mandarin Chinese. *Natural Language & Linguistic Theory*, *18*(4), 723–770.

Lardière, D. (2007). *Ultimate attainment in second language acquisition: A case study*. Mahwah, NJ: Lawrence Erlbaum.

Lardiere, D. (1998a). Case and tense in the fossilized steady state. *Second Language Research*, *14*, 1–26.

Lardiere, D. (1998b). Dissociating syntax from morphology in a divergent end-state grammar. *Second Language Research*, *14*, 359–375.

Lardiere, D. (2000). Mapping features to forms in second language acquisition. In J. Archibald (Ed.), *Second Language Acquisition and Linguistic Theory* (pp. 102–129). Malden, MA and Oxford: Blackwell.

Lasser, I. (1997). *Finiteness in Adult and Child German*. Radboud University Nijmegen.

Leal, T., Slabakova, R., & Farmer, T. A. (2016). The fine-tuning of linguistic expectations over the course of L2 learning. *Studies in Second Language Acquisition*, *0*, 1–33.

Li, C. N., & Thompson, S. A. (1981). *Mandarin Chinese: A Functional Reference Grammar*. Berkeley, Los Angeles, London: University of California Press.

Li, D., & Cheng, M. (2008). *A Practical Chinese Grammar for Foreigners (Revised Edition)*. Beijing: Beijing Language and Culture University.

Li, J. (1924). *Xinzhu Guoyu Wenfa [New Chinese Grammar]*. Beijing: Commercial Press.

Li, J., & Liu, J. (2005). Finiteness and non-finiteness in Chinese. *Chinese Language Learning*, *1*, 19–24.

Li, P. (1998). Crosslinguistic variation and sentence processing: The case of Chinese. In Hillert, D. (Ed.), *Sentence Processing: A Crosslinguistic Perspective* (pp. 33–53). Academic Press.

Li, T. (1999). *Xiandai Hanyu Shizhi Yanjiu [Study on Tense in Morden Chinese]*. Shenyang: Liaoning University Press.

Li, Y.-H. A. (1985). *Abstract Case in Chinese*. Los Angeles: University of Southern California.

Li, Y.-H. A. (1990). *Order and Constituency in Mandarin Chinese*. Dordrecht: Kluwer.

Lin, J.-W. (2006). Time in a language without Tense: The case of Chinese. *Journal of Semantics*, *23*, 1–53.

Lin, J., Huang, C., Zhang, H., & Xu, H. (2012). The headedness of Mandarin Chinese serial verb constructions : A corpus-based study. *26th Pacific Asia*

Conference on Language, 428–435.

Liu, D. (2010). Chinese as a verby language: On typological differences between verby languages and nouny languages. *International Chinese Teaching*, *24*(1), 3–17.

Liu, S. (2012). *On Strategies for the Use of English Non-finite Verbs---Solutions to the Misuse of Non-finite Verbs by Chinese Non-English majors*. Wuhan Technology University.

Lozano, C., & Mendikoetxea, A. (2013). Learner corpora and second language acquisition: the design and collection of CEDEL2. In A. Diaz-Negrillo, N. Ballier, & P. Thompson (Eds.), *Automatic Treatment and Analysis of Learner Corpus Data* (pp. 65–100). Amsterdam: John Benjamins.

Luk, Z. P.-S., & Shirai, Y. (2009). Is the acquisition order of grammatical morphemes impervious to L1 knowledge? Evidence from the acquisition of plural -s, articles, and possessive 's. *Language Learning*, *59*, 721–754.

Luke, K. K., Liu, H. L., Wai, Y. Y., Wan, Y. L., & Tan, L. H. (2002). Functional anatomy of syntactic and semantic processing in language comprehension. *Human Brain Mapping*, *16*, 133–145.

Lv, S. (1942). *Zhongguo Wenfa Yaolv [The gist of Chinese grammar]*. Beijing: The Commercial Press.

Lv, S. (1947). *Zhongguoren Xue Yingyu [Chinese learn English]*. Beijing: China Social Science Press.

Ma, J. (1898). *Mashi Wentong [Ma's Grammar]*. Beijing: The Commercial Press.

Mackey, A., & Gass, S. M. (2005). *Second Language Research: Methodology and Design*. Mahwah NJ: Lawrence Erlbaum Associates.

MacWhinney, B. (1987). The competition model. In B. MacWhinney (Ed.), *Mechanisms of Language Acquisition* (pp. 249–308). Hillsdale, NJ: Lawrence Erlbaum.

MacWhinney, B. (2005). A unified model of language acquisition. In J. Kroll & A. De Groot (Eds.), *Handbook of Bilingualism: Psycholinguistic Approaches*. New

York: Oxford University Press.

MacWhinney, B., & Bates, E. (1989). *The Crosslinguistic Study of Sentence Processing*. New York: Cambridge University Press.

Mai, Z. (2015). L2 Chinese: grammatical development and processing. *Second Language Research*, 1–19.

Mandell, P. B. (1999). On the reliability of grammaticality judgement tests in second language acquisition research. *Second Language Research*, *15*(1), 73–99.

Marinis, T. (2010). Using on-line processing methods in language acquisition research. In S. U. & E. Blom (Ed.), *Experimental Methods in Language Acquisition Research [Language Learning and Language Teaching 27]* (pp. 139–162). John Benjamins.

Marinis, T., Roberts, L., Felser, C., & Clahsen, H. (2005). Gaps in second language sentence processing. *Studies in Second Language Acquisition*, *27*, 53–78.

Marvin, M. (2013). Grammaticality judgement tests and linguistic ability in second language acquisition. Retrieved from http://blog.journals.cambridge.org/2013/09/13/grammaticality-judgment-tests-and-linguistic-ability-in-second-langauge-acquisition/

Masters, R. S. W. (1992). Knowledge, knerves and know-how: The role of explicit versus implicit knowledge in the breakdown of a complex motor skill under pressure. *British Journal of Psychology*, *83*, 343–358.

Matthews, S., & Yip, V. (2003). Relative clauses in early bilingual development: Transfer and universals. *Typology and Second Language Acquisition*, 39–81.

McEnery, T., & Wilson, A. (2001). *Corpus Linguistics*. Edinburgh: Edinburgh University Press.

McEnery, T., & Xiao, R. (2016). Corpus-based study of Chinese. In S. Chan (Ed.), *The Routledge encyclopedia of the Chinese language* (pp. 438–452).

Meng, Z., Zheng, H., Meng, Q., & Cai, W. (1999). *Hanyu Dongci Yongfa Cidian [Chinese Verbs Usage Dictionary]*. Beijing: Commercial Press Ltd.

Moattarian, A. (2013). Bidirectional crosslinguistic influence in language learning:

Linguistic aspects and beyond. *International Journal of Linguistics*, *5*(4), 38–49.

Myles, F. (2005). Interlanguage corpora and second language acquisition research. *Second Language Research*, *21*(4), 373–391.

Nikolaeva, I. (2007). *Finiteness: Theoretical and Empirical Foundations*. Oxford: Oxford University Press.

Odlin, T. (1989). *Language Transfer*. Cambridge: Cambridge University Press.

Odlin, T. (2005). Crosslinguistic influence and conceptual Transfer: What are the concepts? *Annual Review of Applied Linguistics*, *25*, 3–25.

Paul, W. (2008). The "serial verb construction" in Chinese: A tenacious myth and a Gordian knot. *The Linguistic Review*, *25*(3/4), 367–411.

Prévost, P., & White, L. (2000). Missing Surface Inflection or Impairment in second language acquisition? Evidence from tense and agreement. *Second Language Research*, *16*(2), 103–133.

Ren, H. (2010). Guanyu zhongjieyu yuliaoku jianli de jidian sikao--yi HSK dongtai zuowen yuliaoku weili[Some thoughts on the establishment of interlanguage corpora-HSK dynamic composition corpus as an example]. *Language Teaching and Research*, *6*.

Ringbom, H. (1992). On L1 Transfer in L2 Comprehension and L2 Production. *Language Learning*, *42*(1), 85–112.

Roberts, L., & Felser, C. (2011). Plausibility and recovery from garden paths in second language sentence processing. *Applied Psycholinguistics*, *32*(2), 299–331.

Roberts, L., Gullberg, M., & Indefrey, P. (2008). Online pronoun resolution in L2 discourse: L1 influence and general learner effects. *Studis in Second Language Acquisition*, *30*, 333–357.

Roberts, L., & Liszka, S. a. (2013). Processing tense/aspect-agreement violations on-line in the second language: A self-paced reading study with French and German L2 learners of English. *Second Language Research*, *29*(4), 413–439.

Rocca, S. (2003). Lexical aspect in child second language acquisition of temporal morphology: a bidirectional study. In R. Salaberry & Y. Shirai (Eds.), *The L2 Acquisition of Tense–aspect Morphology* (pp. 249–284). Amsterdam: John Benjamins.

Sabourin, L. (2001). L1 effects on the processing of grammatical gender in L2. *EUROSLA Yearbook*, *1*, 159–169.

Sauter, A., Bailey, C., Wyllie, J. M., & Glare, P. G. W. (1968). *Oxford Latin Dictionary (Vol. 1)*. Oxford: Clarendon Press.

Schütze, C. T., & Sprouse, J. (2014). Judgment Data. *Research Methods in Linguistics*, (May), 27–50. Retrieved from http://web.mit.edu/hackl/www/lab/turkshop/readings/schutze-sprouse2011.pdf

Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, *10*, 209–231.

Selinker, L. (1992). *Rediscovering Interlanguage*. London: Longman.

Shen, X. (2009). Jiyu yuliaoku de waiguo xuesheng shuang binyu ju pianwu fenxi [A corpus-based error analysis of foreign students' double-object sentences]. *Journal of the Chinese Language*, *12*, 1–4.

Shi, W. (2010). Empirical study on Chinese learners' acquisition of non-finite clauses. *Journal of Chongqing University of Science and Technology (Social Sciences Edition)*, *10*, 186–189.

Shi, Y. (2001). Differences between Chinese finite and non-finite verbs. *International Chinese Teaching*, *2*(56), 23–27.

Slabakova, R. (2009). What is easy and what is hard to acquire in a second language? In Melissa Bowles et al. (Ed.), *Proceedings of the 10th Generative Approaches to Second Language Acquisition Conference (GASLA 2009)* (pp. 280–294). Somerville, MA: Cascadilla Proceedings Project.

Slabakova, R. (2015). Acquiring temporal meanings without tense morphology: The case of L2 Mandarin Chinese. *The Mordern Language Journal*, *99*(2), 283–307.

Song, Y. (2000). Ke bu keyi sheli dongmingci? [Should Chinese have gerunds?].

Chinese Study, *4*, 22.

Sun, X. (2008). *Seiral Verb Constructions in Mordern Chinese and Its Acquisition*. Nanjing Normal University.

Tan, F. (1995). The expression of "generalization" and differences between finite and non-finite Verbs. In *Paper presented at the the 4th International Chinese Teaching Conference.*

Tang, C.-C. J. (1990). *Chinese Phrase Structure and the Extended X-theory*. Cornell University.

Tang, S. W., & Lee, T. H. T. (2000). Focus as anchoring condition. In *Paper presented at the International Symposium on Topic and Focus in Chinese*. The Hongkong Polytechnic University.

Tang, T. (2000). Chinese finite clause and non-finite clause. *Language and Linguistics*, *1*(1), 191–214.

Tao, L. (2009). Serial verb construction in Mandarin Chinese: The interface of syntax and semantics. In *Paper presented at the the 21st North American Conference on Chinese Linguistics (NACCL-21)*. Smithfield, Rhode Island: Bryant University.

Team, R. C. (2014). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Retrieved from http://www.r-project.org/

Theakston, A. L. (2004). The role of entrenchment in children's and adults' performance on grammaticality judgment tasks. *Cognitive Development*, *19*, 15–34.

Touchie, H. Y. (1986). Second language learning errors: Their types, causes, and treatment. *JALT Journal*, *8*(1), 75–80.

Trenkic, D., Mirkovic, J., & Altmann, G. (2014). Real-time grammar processing by native and non-native speakers: constructions unique to the second language. *Bilingualism: Language and Cognition*, *17*(2), 237–257.

Tsai, W. T. D. (2006). Tense anchoring in Chinese. In *Paper presented at the the 4th*

Conference of European Association of Chinese Linguistics. Hungarian Academy of Sciences, Budapest.

Upton, T., & Lee-Thompson, L. (2001). The role of the first language in second language reading. *Studies in Second Language Acquisition*, *23*, 469–495.

Vanek, N., & Selinker, L. (2017). Covariation between temporal interlanguage features and nonverbal event categorisation. *IRAL - International Review of Applied Linguistics in Language Teaching*, *55*(3), 223–243.

Wang, D. (2010). *Nominalization and Verbalization in Contemporary Chinese:A Cognitive Linguistic Inquiry*. Beijing: China Social Science Press.

Wang, L. (1954). *Zhongguo Yufa Lilun [Chinese Grammar Theory]*. Beijing: Zhonghua Shuju Press.

Wang, M. (2005). Liuxuesheng bi zi ju xide de kaocha [A study of foreign learners' acquisition of Bi structure]. *Journal of the College of Chinese Language and Culture of Jinan University*, *3*, 28–35.

Weinreich, U. (1953). *Languages in Contact*. The Hague: Mouton.

Wen, L., & Hu, F. (1954). Tan ci de fenlei [On the classification of words]. *Zhongguo Yuwen [Chinese Language]*, *3*.

Wen, Q., & Wang, J. (2008). *The Parallel Corpus of Chinese EFL Learners (PACCEL)*. Beijing Foreign Studies University.

Wen, Q., Wang, L., Liang, M., & Yan, X. (2005). *The Spoken and Written Corpus of Chinese Learners (SWECCL)*. Foreign Language Teaching and Research Press.

Wen, Z., & Schwartz, B. D. (2014). Fully-specified L2 processing of negation-aspect interactions in Chinese. *Selected Proceedings of the 5th Conference on Generative Approaches to Language Acquisition North America (GALANA 2012)*, (Galana 2012), 128–139.

Whorf, B. L. (1945). Grammatical categories. *Language*, *21*(1), 1–11.

Winter, B. (2013). Linear models and linear mixed effects models in R with linguistic applications. Retrieved from arxiv:1308.5499. [http://arxiv.org/pdf/1308.5499.pdf]

Wu, Y. (2014). *Jiyu HSK Dongtai Zuowen Yuliaoku de Yingyu Guojia Butong Dengji Hanyu Xuexizhe Yupian Xianjie Pianwu Bijiao Yanjiu [A Comparative Study of Discourse Cohesion Errors of Chinese Learners of Different Levels in English-speaking Countries Based on HSK Dynamic Corpus]*. ZheJiang University.

Xiao, Y. (2002). The syntactic development of school-age Chinese-speaking children learning English. *International Review of Applied Linguistics in Language Teaching*, *40*(3), 235–271.

Xing, X. (2004). *Xiandai Hanyu Jianyushi [Pivotal Sentences in Modern Chinese]*. Beijing: Communication University of China press.

Xu, J. (2006). Sentence head and the predicate-initial position. *Chinese Linguistics*, *3*, 51–61.

Xu, L. (1986). Free empty category. *Linguistic Inquiry*, *17*, 75–94.

Xu, L. (1995). Definiteness effects on Chinese word order. *Cahiers de Linguistique Asie Orientale*, *24*, 29–48.

Xu, L. (1999). A special use of the third person singular pronoun. *Cahiers de Linguistique Asie Orientale*, *28*, 3–22.

Yang, B. (2015). Cong yinxing fanchou he jianbianqun de shijiao renshi hanyu dongci de xiandingxing [Study of finiteness of Chinese verbs from covert category and clinisation]. *Contemporary Foreign Lanuage Study*, *8*, 6–10.

Yang, D. (2004). Riyu muyu xuexizhe quxiang buyu xide qingkuang fenxi [A study of the Japanese speaking students' acquisition of Chinese directional complements]. *Journal of the College of Chinese Language and Culture of Jinan University*, *3*, 23–35.

Yang, H., & Wei, N. (2005). *Construction and data analysis of a Chinese leaner spoken English Corpus*. Shanghai: Shanghai Foreign Language Education Press.

Yang, L. (2008). *Topic Prominence in Typological Interlanguage Development of Chinese Students' English*. Shanghai International Studies University.

Yang, L. (2012). *The Empirical Research on the Acquisition of Non-predicate Verbs for Chinese Learners*. Hubei Industry University.

Yang, S., & Huang, Y. (2009). Jufa jiegou dui yingyu shiti xitong xide de yingxiang [The influence of morphosyntax on acquisition of tense and aspect]. In J. Cai (Ed.), *Empirical Studies of the EFL Learners' Acquisition of English Tense and Aspect in China*. Beijing: International Books Press.

Yang, Y., & Lyster, R. (2010). Effects of form-focused practice and feedback on Chinese EFL learners' acquisition of regular and irregular past tense forms. *Studies in Second Language Acquisition*, *32*, 235–263.

Yang, Y., & Tsai, B. (2011). On the mechanism of inflection and finiteness of Chinese verbs. *International Chinese Teaching*, *25*(2), 159–174.

Yao, P., & Chen, B. (2017). Cross-linguistic differences affect late Chinese-English learners on-line processing of English tense and aspect. *International Journal of Bilingualism*, *17*, 268–290.

Yip, V. (1995). *Interlanguage and Learnability: from Chinese to English*. Amsterdam: John Benjamins.

Yip, V., & Matthews, S. (1995). I-interlanguage and typology: The case of topic-prominence. In E. Lynn, L. Selinker, & M. Sharwood Smith (Eds.), *The current state of interlanguage* (pp. 17–30). Amsterdam: Benjamins.

Yu, M. (2004). Interlinguistic variation and similarity in second language speech act behavior. *Modern Language Journal*, *88*, 102–119.

Yuan, B. (1995). Acquisition of base-generated topics by English-speaking learners of Chinese. *Language Learning*, *45*(4), 567–603.

Yuan, B. (1998). Interpretation of binding and orientation of the Chinese reflexive Ziji by English and Japanese speakers. *Second Language Research*, *14*(4), 324–340.

Yuan, B. (2004). Negation in Frech-Chinese, German-Chinese and English-Chinese interlangauges. *Transactions of the Philological Society*, *102*(2), 169–197.

Yuan, B. (2007). Behaviours of wh -words in English speakers' L2 Chinese wh -

questions : Evidence of no variability , temporary variability and persistent variability in L2 grammars. *Bilingualism: Language and Cognition*, *10*(3), 277–298.

Yuan, B. (2010). Asymmetric syntactic and thematic reconfigurations in English speakers ' L2 Chinese resultative compound constructions. *International Journal of Bilingualism*, *15*(1), 38–55.

Yuan, B. (2015). The effect of computational complexity on L1 transfer : Evidence from L2 Chinese attitude-bearing wh-questions. *Lingua*, *167*, 1–18.

Yuan, B. (2017). Can L2 sentence processing strategies be native-like？Evidence from English speakers'L2 processing of Chinese base-generated-topic sentences. *Lingua*, *192*, 42–64.

Yuan, B., & Dugarova, E. (2012). Wh-topicalization at the syntax-discourse interface in English speakers' L2 Chinese grammars. *Studies in Second Language Acquisition*, *34*, 533–560.

Yuan, B., & Zhao, Y. (2005). Resumptive pronouns in English-Chinese and Arabic-Chinese Interlanguages. *IRAL*, *43*, 219–237.

Yuan, Y. (2005). Shi xi zhongjieyu zhong gen bu xiangguan de pianwu [An Analysis of Interlanguage Errors Related to Bu]. *Language Teaching and Research*, *6*, 39–47.

Zhang, B. (2010). Avoidance and overgeneralization —An investigation of acquisition of the Bǎ-sentence based on the HSK dynamic composition corpus. *Teaching Chinese in the World*, *24*(2), 263–277.

Zhao, Y. (2006). *Causativity in L2 Chinese Grammars*. Beijing: Peking University Press.

Zhao, Y. (2011). Review article: A tree in the wood: A review of research on L2 Chinese acquisition. *Second Language Research*, *27*(4), 559–572.

Zheng, Y. (2006). Zhongjieyu zhong chengdu fuci de shiyong qingkuang fenxi [An analysis of foreign learners' use of degree adverbs]. *Chinese Language Learning*, *6*, 66–72.

Zhou, W. (2009). A Corpus-based study on the acquisition of bi-constituent sentences. *Language Teaching and Study*, *3*, 40–47.

Zhou, W., & Xiao, X. (2004). Zhongjieyu Pianwu Xinxi Yuliaoku [Interlanguage Error Information Corpus]. Nanjing Normal University.

Zhou, X., & Hong, W. (2010). Zhonggaoji liuxuesheng Hanyu zhongjieyu cige shiyong qingkuang kaocha [A study on the use of figures of speech in the Chinese interlanguage of the intermediate and advanced Chinese learners]. *Teaching Chinese in the World*, *4*, 536–545.

Zhu, D. (1985). *Yufa Dawen [Grammar Questions and Answers]*. Beijing: Commercial Press.