

From a simple to a complex aspectual system: feature reassembly in L2 acquisition of Chinese imperfective markers by English speakers

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Abstract:

This paper reports on an empirical study on the acquisition of Chinese imperfective markers (*zai*, *-zhe_P* and *-zhe_R*) by English-speaking learners at three proficiency levels. Compared to English, Chinese has a richer imperfective aspect in terms of markers (forms) and features (meanings). Results are presented from a grammaticality judgement task, a sentence-picture matching task and a sentence completeness judgement task. We find that advanced learners are successful in reassembling additional semantic features (e.g. the [+durative] feature of *zai* and the [+atelic] feature of *-zhe_P*), when the L1 and L2 functional categories to which the to-be-added features belong are the same. However, advanced learners have problems in differentiating between the interpretations of the progressive *zai* and the resultant-stative *-zhe_R*, and are not sensitive to the incompleteness effect of *-zhe_P*, which indicates that discarding L1-transferred features is arduous for learners. Our findings, in general, support the predictions of the Feature Reassembly Hypothesis (Lardiere, 2009). In addition, there is some evidence obtained for L1 influence, which persists at an advanced stage.

Keywords:

Imperfective aspect, Chinese, English, feature reassembly, L1 effects

0. Introduction

Minimalist syntactic approaches (e.g. Chomsky, 1995) have made a principled distinction between functional and lexical categories. Functional categories and their feature sets have been proposed as the locus of all cross-linguistic differences (Borer, 1984). Learning a second language involves learning the new feature bundles in which the various formal features are mapped onto the target language functional morphology (Slabakova, 2009). Formal linguistic approaches to SLA research have focused mainly on the acquisition of features bundled onto functional categories. Form (lexical item)-function (feature) relationships in the L1 and L2 are not always equal. Learning how features are assembled or re-assembled into lexical items is something that L2 learners

must engage in when restructuring their grammars. The Feature Reassembly Hypothesis (FRH; Lardiere, 2008, 2009) stresses the re-configuration of features that exist both in the L1 and L2.

English is argued to be a fully-tensed language but formal markers of aspect in English are not predominant in the verb (Brinton, 1988). There is an aspectual opposition between progressive (verb *to be* and verbal form in *-ing*) and non-progressive in English, which pervades the whole of the non-stative verbal system (Comrie, 1976). Although Chinese does not have dedicated inflection to express tense, number, gender, or case, it employs morphemes to mark aspect (Klein et al., 2000, p. 723). Aspect markers are the only kind of morphology-like devices in Chinese (Gu, 1995) and their functions are argued to be complex (e.g. Li and Thompson, 1981; Smith, 1997; Lin, 2002, 2003; Xiao and McEnery, 2004). Aiming to explore detailed mechanisms in the feature reassembly process and learning difficulties that they raise, the present study focuses on the L2 acquisition of Mandarin imperfective markers (*zai*, *-zhe_P* and *-zhe_R*) and their features by English speaking learners. The organisation of this article is as follows. We first compare the imperfective marking systems of English and Chinese in Section 1, introduce relevant L2 theories and previous acquisition research on Chinese imperfectives in Sections 2 and 3, respectively, and then report our experimental study as the main body of the article.

1. Imperfective marking in English and Chinese

Aspect is a grammatical category to present a situation from a particular viewpoint and depict how the situation unfolds over time (Klein, 2009). In more recent research, linguists treat aspect as an interactive system and distinguish grammatical aspect (or viewpoint aspect) and lexical aspect (also known as situation aspect, inherent aspect or *Aktionsart/Aktionsarten*) (Smith, 1991/1997; Slabakova, 2005), both of which contribute to the aspectual meaning of a sentence.

The most basic grammatical/viewpoint aspect opposition is perfective and imperfective (Comrie, 1976; Smith, 1991/1997). Perfectivity indicates the view of a situation as a single whole and bounded, while the imperfective is viewed as not bounded, linguistically presenting an open situation. We adopt Smith's (1997) analysis that imperfectives allow inferences about beginnings and endings: imperfectives focus on internal phases of an event or on present external stages (e.g. the preliminary or the resultant stages) of a situation. Specific imperfective meanings will be discussed in detail later. On the other hand, lexical/situation aspect concerns the classification of eventualities, regarding their temporal properties. Vendler's (1957) four-way classification (i.e. states, activities, accomplishments and achievements) represents an early attempt to categorise lexical aspect and is followed by the majority of research concerning tense-aspect systems. Based on Vendler's (1957) model, Smith (1991/1997) uses dynamism, telicity and duration to distinguish five basic situation types (with semelfactive as a newly added class). Characteristics of the situation types can therefore be presented as a cluster of conceptual temporal features (i.e. [$\pm$ dynamic], [$\pm$ telic] and [$\pm$ durative]).

In terms of the syntactic status, aspect is normally treated as a functional category and has a maximal projection itself, which is AspP (Aspect Phrase). Recent studies on aspect propose that information about lexical and grammatical aspect are located in

different AspPs: a vP-internal or inner aspect projection for lexical aspect (e.g. Travis, 1991, 2010; Borer, 2005; MacDonald, 2011) and a vP-external or outer aspect projection for grammatical aspect (e.g. Slabakova, 2001; Nossalik, 2010). Outer aspect has morphological manifestations (such as aspect markers) that inner aspect usually does not (MacDonald, 2006). The two AspPs encode different aspectual features: the semantic features [$\pm$ telic] are normally checked at the inner AspP and aspectual features such as [$\pm$ perfective] are checked through overt tense/aspect morphology at the outer AspP (Salaberry, 2008).

Table 1. The English imperfective marker and its features

Marker	Feature	Example
<i>be + -ing</i>	[+progressive]	(A1) He is eating an apple.
	[+resultant-stative]	(A2) He is sitting on the table.

Aspect has been widely discussed in English grammar. Three main types of English imperfective are explored in the literature: habitual¹, progressive and resultant-stative² (Comrie, 1976; Smith, 1991/1997). The latter two meanings are expressed by the same form: the auxiliary *be* and the morpheme *-ing*, as shown in Table 1. According to Smith (1997), progressive and resultant-stative focus on different intervals of a situation: the former presents an interval of an event that includes neither its initial nor final endpoint, and that precedes the final endpoint; whereas the latter presents an interval of a positional or locative that follows the final endpoint of a change of state. The two viewpoints differ also in dynamism. For example, (A1) in Table 1 means that the event of eating an apple is ongoing, which is dynamic. However, (A2) does not convey that he is in the process of assuming a seated position, but presents a resultant interval - he is already seated, which is non-dynamic and does not consist of successive stages.

Since the form of grammatical aspect remains the same in English imperfectives, lexical aspect plays a decisive role in the resulting aspectual interpretation. The English imperfective marker normally co-occurs with non-stative events. Activities and accomplishments, which refer to a dynamic action, can work with *be + -ing* to express that an event is in progress, as (1a) below illustrates. However, if the verb indicates a resultative state after a telic event, such as *wear* in (1b), which specifies the state of having clothes already on the body as the result of putting on, the whole imperfective phrase receives a resultant-stative reading. Verbs that involve a resultant state always have a positional or locative property, such as *sit* and *wear*. In addition, when the imperfective marker works with an achievement verb, such as *reach* in (1c), the verb

constellation expresses a predictive situation happening in the future, which is a form of Futurate (Dowty, 1977).

- (1) a. He is putting on the new coat. (progressive)
 b. He is wearing the new coat. (resultant-stative)
 c. He is reaching the mountaintop. (futurate)

Compared to English, Chinese imperfective marking system is more complex, consisting of two forms: the preverbal *zai*³ and the post-verbal *-zhe*. As a morpheme, *zai* is syntactically freer than *-zhe*: the preverbal *zai* can be used before a small clause that even includes *-zhe*, whereas *-zhe* can only follow a bare verb and function like a suffix. The properties of *zai* and *-zhe* are summarised in Table 2.

Table 2. Chinese imperfective markers and their features

Marker	Feature	Example
<i>zai</i>	[+progressive]	(A1) Ta zai chuan waitao. s/he ASP wear/put on coat 'He is putting on a coat.'
	[+durative]	(A2) *Ta zai daoda shanding. s/he ASP reach mountaintop 'S/he is reaching the mountaintop.'
	[+T]	(A3) Ta zai chang ge. s/he ASP sing song 'S/he is singing.'
<i>-zhe_P</i>	[+progressive]	(B1) #Ta chang zhe ge. s/he sing ASP song 'S/he is singing.'
	[+atelic]	(B2) *Ta gai zhe yi dong fangzi. (Lin, 2002) s/he build ASP one CL house 'S/he is building a house.'
		(B3) *Ta daoda zhe shanding. he reach ASP mountaintop 'S/he is reaching the mountaintop.'
<i>-zhe_R</i>	[+resultant-stative]	(C1) #Ta chuan zhe waitao. he wear/put on ASP coat 'S/he is wearing a coat.'

Note. # marks the incompleteness in question; ASP is for Aspect; and CL is for Classifier.

The preverbal *zai* acts as a progressive marker, indicating the ongoingness of an event, as illustrated in (A1). Unlike its English counterpart, *zai* is restricted to durative events and hence not compatible with achievements. As in (A2), *zai* cannot present the preliminary stages of the event of reaching the mountaintop as *be + -ing* does in (1c), which shows that *zai* is sensitive to the durativity parameter⁴. Moreover, *zai* is able to make an unbounded activity stand alone as a complete sentence as in (A3), whereas the corresponding *-zhe* sentence (B1) sounds incomplete. The subtle difference between *zai* and *-zhe* in the so-called incompleteness effect is overlooked in the majority of theoretical work on Chinese aspect markers, because it does not directly concern grammaticality (for example, both (A3) and (B1) are licit in Huang et al.'s (2009) study). Tsai (2008) is the only influential study by far that systematically examines the phenomenon whereby some sentences with an aspect marker are judged to be incomplete in isolation and relates the incompleteness effects to a syntactic process of 'tense anchoring'. Tsai proposes that, although Chinese verbs are not inflected for overt morphological tense markers, Chinese has weak syntactic tenses, which cannot manifest as specific tense features (e.g. [+past] and [+present]) but can have a sentence tense anchored. Tense anchoring is a process of spelling out an event variable in morpho-syntactic terms. One way to achieve 'tense anchoring' is through Asp-to-T raising: the progressive *zai* locates at the head of the outer AspP and can raise to T to instantiate a lexical tense operator⁵. Our views on Chinese syntactic tenses and the function of *zai* are in line with Tsai (2008). We argue that the tense anchoring function can be analysed as a semantic feature [+T], which is the motivation of the Asp-to-T movement of *zai*. It should be checked at the head T position to license a Chinese sentence regarding tense.

In terms of the post-verbal *-zhe*, we agree with researchers like Zhu (1982), Chen (1999), and Tsai (2008), among others, who argue that imperfective *-zhe* has two different viewpoints: progressive and resultant-stative. The aspect meaning depends on the verb phrase that works with *-zhe*.

The progressive *-zhe* (abbreviated as *-zhe_P*) and *zai* differ in the tense-anchoring function and selection requirements on the predicate. First, sentences composed by an activity and *-zhe_P* sound incomplete, and normally indicate a background action in a complex sentence or require the co-occurrence of a sentence-final particle (e.g. the particle *ne* for a [noteworthy] meaning). For instance, *chang zhe ge* in (B1) can function as a background clause in a sentence like *Ta (chang zhe ge) gan-wan le huor* 'He finished this work while singing', or be accompanied by *ne* in the free-standing sentence *Ta (chang zhe ge) ne* 'He is singing'. This is because *-zhe_P* does not have a [+T] feature like *zai* does, which can trigger an Asp-to-T movement and implement tense anchoring in the syntactic sense. Secondly, when interacting with the predicate, *zai* is sensitive to durativity but *-zhe_P* to telicity. Telic predicates (i.e. accomplishments and achievements) is not compatible with *-zhe_P*, as illustrated in (B2) and (B3).

The resultant-stative *-zhe* (abbreviated as *-zhe_R*) appears only with verbs that express a certain degree of attachment, such as Mixed Telic-Stative verbs (MTS verbs, e.g. *chuan/dai* 'to wear/ to put on', *na* 'to fetch/to hold') and positional verbs (e.g. *zuo* 'to sit'). Mixed Telic-Stative verbs (Li, 1990) are a special type of Chinese verbs that encode the whole process of a telic action and the state resulting from that process. Progressive and resultant-stative markers focus on different intervals of the event. For example, the verb *chuan* 'to wear/ to put on' can denote both the dynamic action and the resultant state

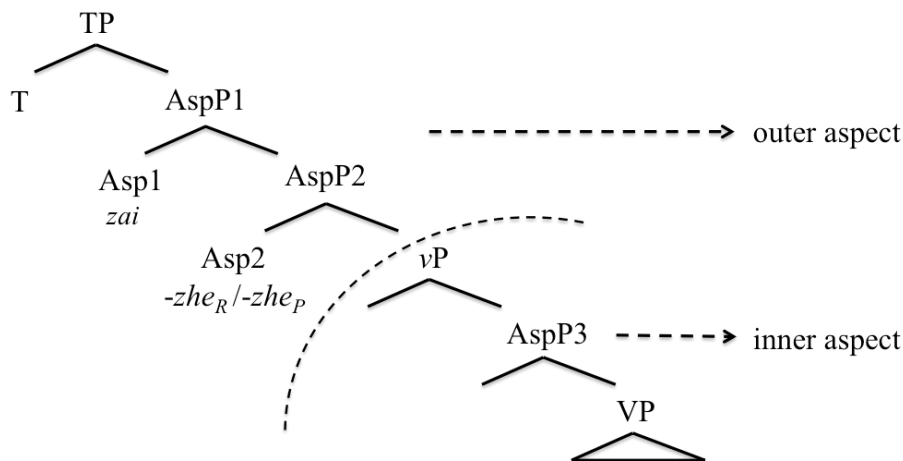
of putting on. In (C1), *-zhe_R* presents the state resulting from the process of putting on the coat, and the verb *chuan* here corresponds to the English verb *wear*. The aspectual difference between (C1) and (A1) results from the use of different imperfective markers. Moreover, similar to *-zhe_P*, *-zhe_R* does not have a [+T] feature and sentences such as (C1) sound incomplete. There are several types of strategy to save predicates with *-zhe_R* from the incompleteness effects: adverbial quantification, subordination, and locative-existential construals (Tsai, 2008).

It is controversial that whether *-zhe_R* and *-zhe_P* are one marker with two meanings or two separate markers. We argue that the two *-zhes* should be treated as two different markers, due to the fact that some sentences with *-zhe* can be ambiguous between progressive and resultant-stative, as illustrated in (2). When working with the MTS verb *zhuang* ‘to load/to be loaded with’, *-zhe* can indicate either an internal interval of the specific action of move or an external interval of the final state.

- (2) #Ta zhuang zhe nei xie qian.
 he load ASP that CL money
 ‘He was putting the money (into his pocket/a bag)./
 He carried the money.’

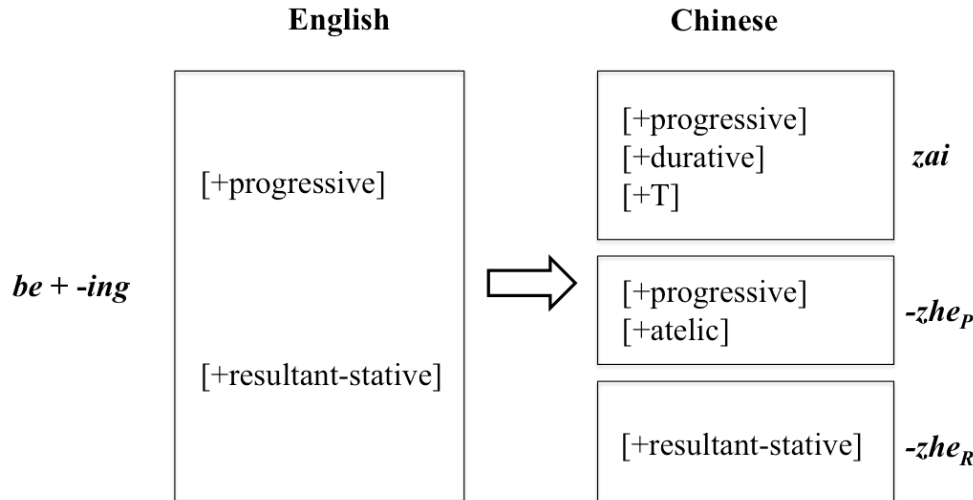
As for the syntax, questions arise about the syntactic structure of Chinese aspect phrases and the nature of the interaction between the aspect marker and the predicate. Due to the syntactic and semantic differences between the viewpoint forms, a double-aspect (e.g. Huang et al., 2009) or a multiple-aspect structure (e.g. Tsai, 2008) are proposed to account for the derivation of Chinese imperfective sentences. We agree with the studies that propose each aspect marker can have its own maximum projection, namely AspP (Tsai, 2008; Huang et al., 2009). There is a consensus that the preverbal *zai* directly fits into a higher Asp head position and its maximal projection (AspP1) is above vP, as shown in Figure 1. However, it is controversial whether the lower AspP that accommodates *-zhe* is above vP as well and whether *-zhe_R* and *-zhe_P* are generated in different AspPs. We argue that *-zhe_R* and *-zhe_P* are located in the same layer⁶, and adopt the analysis of Huang et al. (2009), which proposes the aspectual projection of *-zhe_R* and *-zhe_P* (AspP2) is between AspP1 and vP.

Figure 1.



As we discussed above, the Chinese imperfective markers have some selectional restrictions on the predicate they can co-occur with and have some temporal properties as well. A central question is what set of values the markers can have. It is commonly argued that the situation aspect (static/dynamic; telic/atelic; durative/punctual) is expressed by the predicate and the viewpoint aspect (imperfective/perfective) is indicated in aspect markers. However, unlike the English marker *be + -ing*, the Chinese *zai* is restricted to durative verb phrases and *-zhe_P* is incompatible with telic events. Aspectual coercion is not triggered by the combination of *zai/-zhe_P* and an achievement. It is reasonable to assume that *zai* is inherently specified as [+durative] and *-zhe_P* as [+atelic]. In other words, the Chinese grammar requires that telicity and durativity be assigned to the functional heads by the imperfective morphology. We adopt the outer-and-inner aspect analysis proposed by Travis (2010): while situation aspect is encoded by a vP-internal or inner aspect projection, viewpoint aspect is encoded by a vP-external or outer aspect projection. As presented in Figure 1, AspP1 and AspP2 are outer AspPs, whereas AspP3 is an inner AspP, for lexical aspect only. The outer AspPs that accommodate the markers scope over the inner AspP. If the semantic feature attached to Asp1/2 and that to Asp3 are of the opposite value (e.g. [+telic] vs. [-telic]), the sentence will be illegal due to a semantic clash. Moreover, We agree with Tsai (2008) that Chinese is a language without tense morphology but has weak syntactic tense: there is a TP above AspPs. We tentatively argue that *zai* has a tense-anchoring [+T] feature and can carry out an Asp-to-T movement to get the feature checked at the head T position.

Figure 2.



Looking at imperfectives in English and Chinese at a morpholexical level, we summarise the aspect markers and their features in Figure 2. Chinese grammatical aspect system is richer than that in English: diverse aspectual meanings are expressed by more than one form. Due to the difference in how temporal-aspectual features are assembled between the two languages, English-speaking learners of Chinese need to reconfigure the feature sets of the Chinese markers in their L2, which is dubbed a feature reassembly process in the following section.

2. L1 influence and feature reassembly in L2 aspect

The role of the first language (L1) has been controversial in the SLA. Many studies investigating aspect-related morphology have shown evidence of L1 influence in the acquisition process. Most of them are on L2 acquisition of Indo-European languages, such as English (Salaberry, 2000; Slabakova, 2000; Roberts and Liszka, 2013), Spanish (e.g. Montrul and Slabakova, 2002, 2003; Chin, 2008; Domínguez et al., 2017) and French (Izquierdo and Collins, 2008; McManus, 2015), while less attention has been paid to East Asian languages, such as Korean (e.g. Ryu et al., 2015), Japanese (e.g. Gabriele, 2009; Gabriele and McClure, 2011) and Chinese (e.g. Duff and Li, 2002).

A large body of research on L1 transfer in L2 aspect has been devoted to discussion on in what way and to what extent the learner's L1 affects the learning process. Some recent studies (e.g. Gabriele 2009; Gabriele and McClure, 2011; Roberts and Liszka, 2013; Domínguez et al., 2017) have shown that the aspectual properties and the way of aspectual coding in the L1 transferred into the L2 influence L2 acquisition.

Transferred L1 properties may bring difficulties with the acquisition of aspectual interpretations. For instance, Gabriele and McClure (2011) investigate whether advanced L2 learners can extend beyond the grammatical properties of the L1 by examining the acquisition of the semantics of the imperfective marker *te-iru* in Japanese by native speakers of Mandarin Chinese. L1 effects have been confirmed as the results of an

interpretation task suggest that Chinese learners cannot extend beyond the properties of the L1.

Learning difficulties can also arise from grammatical differences between the L1 and L2. L2 learners are influenced by how aspectual distinctions (imperfective and perfective) are expressed or aspectual meanings are instantiated in their L1. Roberts and Liskzka (2013) report a self-paced reading study designed to investigate whether or not advanced French and German learners of English as an L2 are sensitive to tense/aspect mismatches between a fronted temporal adverbial and the inflected verb that follows (e.g. **Last week, James has gone swimming every day*) in their on-line comprehension. Aspect is grammaticalised in both French and English but not in German. They hypothesise that the difference in the L1 aspectual marking may impact L2 processing. The online-data show that only the French L2 learners were sensitive to the mismatch conditions, whereas the German L2 learners did not show a processing cost at all. They therefore argue that the performance differences between the L2 groups can be explained by influences from the learners' L1: namely, only those whose L1 has grammaticalised aspect (French) were sensitive to the tense/aspect violations online.

Based on the discussion on L1 properties and how they are instantiated in the L1 and L2, some SLA researchers (Choi and Lardiere, 2006; Slabakova, 2008, Lardier, 2008, 2009) further point out that some learnability challenges are brought by the complexity of the mapping between form and meaning. Rooted in Chomsky's (1995, 2005) Minimalist framework, Lardiere (2009) extends Schwartz and Sprouse's (1994, 1996) Full Transfer Full Access (FTFA) model and proposes a Feature Reassembly Hypothesis (abbreviated as FRH). She argues that one of the greatest challenges for L2 learners is to assemble the right combination of features into the lexical items for a given language. More importantly, feature reassembly is especially difficult in cases where the target features do exist in the L1 but are configured differently. In such cases, L2 learners have to disassociate the feature matrices that have been selected and assembled in their L1 and reassemble them in a way that matches the L2 properties. According to Lardiere (2009), the feature reassembly process can be decomposed to two steps⁷:

Step 1: Feature detection and mapping

L2 learners initially look for morpholexical correspondences in the L2 to those in their L1, presumably on the basis of semantic meanings or grammatical functions and then map the feature set of the perceived corresponding L1 item onto the L2 target item.

Step 2: Feature disassociation and reassembly

L2 Learners fine-tune the target feature set by adding or deleting relevant features on the basis of the L2 input.

The FRH has been tested by L2 studies on tense and aspect. For example, Domínguez et al. (2017) investigate the acquisition of the Spanish imperfect by English-speaking learners at three different proficiency levels. To converge on the target grammar, English speakers need to dissociate the 'continuous' and the 'habitual' from the Preterit in their L2 Spanish since these meanings are expressed with forms that also convey perfectivity in English. The results show that the learners have problems with the

‘continuous’ meaning in all tasks, which signals a mapping problem of aspect-related features present in both English and Spanish onto a new form (the Imperfect) and supports the prediction of the FRH.

3. Previous L2 studies on Chinese imperfectives and the research questions

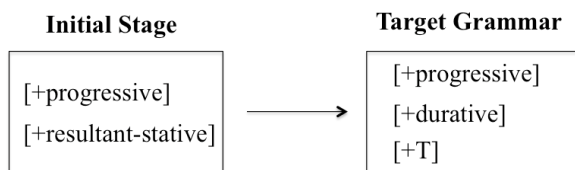
Studies concerning L2 Chinese aspectual systems have mainly focused on whether learners’ developmental patterns in aspectual marking support Andersen and Shirai’s (1996) Aspect Hypothesis (AH), which predicts that the early use of verbal inflection in first and second language acquisition is strongly influenced by situation aspect conveyed by the verb phrases. L2 researchers have found some developmental patterns in L2 Chinese that confirm some predications of the AH (see Zhao, 1996; Wen, 1997; Yang et al., 1999; Jin, 2002, 2009; Jin and Hendriks, 2003; Tong, 2012; Wang, 2012), but there are still some results that do not follow the general course predicted by the AH (e.g. Jin, 2009).

Those studies have shed light on a ‘universal’ aspectual marking pattern and revealed the interaction between aspect markers and situation types in L2 Chinese. However, this approach is quite descriptive and does not have strong explanatory power, especially when the results are at odds with AH predictions. Some studies have pointed out that complex meanings and functions of aspect markers cause problems for L2 learners (e.g. Wen, 1995), but have not clarified how ‘complex’ the meanings, the forms and the mapping/re-mapping mechanisms are, and in what way these factors affect learners’ behaviours. Moreover, from the perspective of aspect markers, research on both *-zhe* and *zai* remains scarce (Jin and Hendriks, 2003; Jin, 2009; Wang, 2012). Hence, in the present study, we do not intend to follow the trend of testing the AH, but turn instead to focusing on the causes of acquisition difficulties and the questions that remain unsolved. To the best of our knowledge, none of the previous studies has systematically investigated the L2 acquisition of Chinese imperfective marking at the morpho-lexical level in a feature reassembly approach.

As discussed in Section 1, the complexity in form-meaning mapping between English and Chinese aspectual properties requires English speakers to reconfigure existing features onto new lexical items in the L2 Chinese. Following the path of the FTFA and the FRH, we assume that the initial state in L2 acquisition is the final state of L1 acquisition and the entirety of the L1 grammar (including features and feature configurations) is transferred to L2. As soon as English speakers have detected that *zai*, *-zhe_P* and *-zhe_R* are the morpholexical correspondences to the English *be* + *-ing* on the basis of semantic meanings and grammatical functions, they would map the features of *be* + *-ing* into the target markers *zai*, *-zhe_P* and *-zhe_R*.

Figure 3.

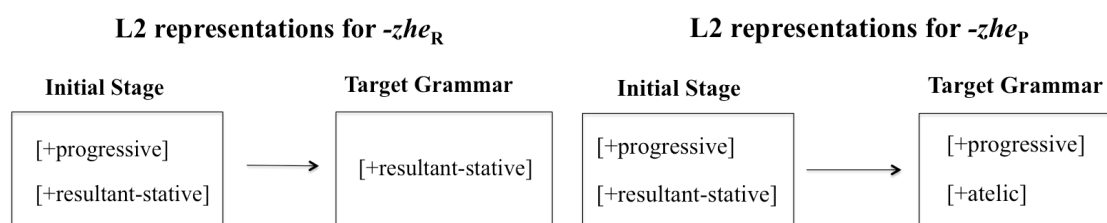
L2 representations for *zai*



To acquire the progressive marker *zai*, in the next step, English speakers need to dissociate the [+resultant-stative] feature from *zai*. They are also expected to re-assemble a [+durative] feature from English lexical non-achievement verbs into *zai*. We therefore hypothesise that English speakers will mistakenly allow the association of *zai* with an achievement verb at the initial stage and a resultant-stative interpretation of *zai* sentences. Since the copular verb *be* in *be + -ing* is always tense-marked, English speakers may plausibly transfer a tense feature (presumably the present tense) from a tense marker into *zai* at the initial stage.

Figure 4.

Figure 5.



The *-zhe_R* and the *-zhe_P* share the same form and the resulting aspectual meaning of a V-*zhe* cluster depends on the verb. English natives need to acquire that when *-zhe* is associated with a verb carrying a certain meaning of attachment, the sentence receives a resultant-stative reading. English speakers are also expected to reconfigure the features of *-zhe_R* and *-zhe_P* in their L2, due to the difference between the L1 and L2 feature sets. Regarding the *-zhe_R*, English speakers need to relinquish the L1 transferred [+progressive] feature. We predict that beginners are not able to reject a progressive reading of *-zhe_R* sentences. For the progressive *-zhe_P*, English natives are presumed to discard the L1 transferred [+resultant-stative] feature and further to re-assemble a [+atelic] feature onto *-zhe_P*. English-speaking learners may not know the telicity constraint and therefore mistakenly allow the association of *-zhe_P* with accomplishments or achievements at the initial stage, since sentences like ‘*he is building a house*’ and ‘*he is winning*’ are acceptable in English. Furthermore, unlike *zai*, which can have an unbounded sentence tense-anchored, *-zhe_{P/R}* lacks the [+T] feature. English speakers are predicted not to be sensitive to the incompleteness effects of *-zhe_P* sentences at early stages.

Based on the analysis and predictions above, four main research questions are asked in the present study:

Question 1: Will English speakers be able to re-assemble the [+durative] feature and the [+atelic] feature into *zai* and *-zhe_P*, respectively, and reject *zai* + V_{achievement} and V_{achievement} *-zhe_P*?

Question 2: Will English speakers be able to assemble the [+atelic] feature into *-zhe_P* and differentiate *zai* and *-zhe_P* in terms of telicity?

Question 3: Will English speakers be able to differentiate *zai* and *-zhe_R* in terms of their aspectual meanings? When co-occurring with MTS verbs (e.g., *chuan* ‘to put on/to wear’), will they relinquish the [+resultant-stative] feature initially transferred into *zai* and the [+progressive] feature initially transferred into *-zhe_R*?

Question 4: Will English speakers have difficulties assembling the [+T] feature into *zai* and be sensitive to the incompleteness effect of *-zhe_P* sentences?

4. Participants and methods

To test the research questions listed, we examine data from 90 participants through three different tasks: an off-line acceptability judgement task (AJT), a sentence-picture matching task (SPMT) and an on-line sentence completeness judgement task (SCJT).

4.1 Participants

The participants consisted of 25 Chinese native speakers (NS) and 65 L2 English-speaking learners of Chinese recruited from universities in the UK and China. On the basis of their performance in a 40-blank Chinese cloze test adopted from Yuan and Dugarova (2012), the learners were classified into three Chinese proficiency groups: 21 beginners, 23 intermediate learners and 21 advanced learners. Table 3 presents the information of the participants. ANOVA tests conducted on the proficiency scores show that the participating groups were significantly different from each other ($F(3, 86) = 327.1, p < .001$). Post-hoc pairwise comparisons revealed that there were statistical differences between all possible pairs of groups in terms of the cloze score ($p < .05$).

Table 3. Participant profile

Groups	Number of participants	Average age (ranges in brackets)	Average no. of months studying Chinese (ranges in brackets)	Average no. of months in a Chinese-speaking environment	Scores in the cloze test (total=40, ranges in brackets)
Beginner	21	20.3 (19-23)	14.9 (7-24)	4.2 (0-10)	11.3 (6-16) *
Intermediate	23	24.5 (19-26)	40.8 (24-56)	6.8 (3-12)	22.7 (18-32)*

Advanced	21	26.7 (23-32)	64.3 (45-120)	19.9 (12-96)	35.1 (33-38)*
NS	25	27.1 (25-31)	N/A	N/A	38.7 (37-40)

Note. * indicates the mean score is significantly different from that of the Chinese native group ($p < .05$).

4.2 Instruments

In order to minimise any possible effects from vocabulary on their behaviours, all the key vocabulary words in the study were selected from the level A (the easiest level) of the *National Syllabus of Graded Words and Characters for Chinese Proficiency* (2001), sent to the participants in advance and checked at the beginning of the experiment. Before the main tasks, a prerequisite test was conducted to ensure that the basic aspectual distinctions (perfective or imperfective) and syntactic positions of the markers (following or preceding the verb) had been established in the participants' L2 Chinese. All the task items were piloted before the main study. The test order of the three main tasks was: the SCJT → the SPMT → the AJT. The instructions of the tasks were provided in the participant's native language.

a. The acceptability judgement task (AJT)

A web-based AJT was administered to all participants, which included the four types listed in Table 4, with each type having 4 tokens. Types A-1 and A-2 are for Question 1, to test whether the learner will reject the association of achievements with *zai* and that with *-zhe_P*. Types B-1 and B-2 are for Question 2, investigating whether the learner can differ *zai* from *-zhe_P* in telicity. The participant was asked to decide whether the sentence is 'completely unacceptable', 'probably unacceptable', 'probably acceptable' or 'completely acceptable'. There was also an 'I don't know' option.

Table 4. Target features/structures and sample items in the AJT

Type	Target feature / structure	Sample sentence
A-1	<i>zai</i> [+durative] + V _{achievement}	*Ta <i>zai</i> <i>daoda</i> <i>shanding</i> . s/he ASP reach mountaintop 'S/he is reaching the mountaintop.'
A-2	V _{achievement} - <i>zhe_P</i> [+atelic]	*Ta <i>daoda zhe</i> <i>shanding</i> . s/he reach ASP mountaintop 'S/he is reaching the mountaintop.'

B-1 *zai* + V_{accomplishment}

Ta *zai* *gai* *yi* *dong* *fangzi*.
s/he ASP build one CL house
'S/he is building a house.'

B-2 V_{accomplishment} -*zhe*_P [+atelic]

*Ta *gai* *zhe* *yi* *dong* *fangzi*.
s/he build ASP one CL house
'S/he is building a house.'

Note. * indicates ungrammatical sentences.

b. The sentence-picture matching task (SPMT)

A sentence-picture matching task was designed for Question 3, to explore whether participants can distinguish between different aspectual meanings of the progressive *zai* and the resultant-stative -*zhe*_R when the markers are associated with the Mixed-Stative-Telic verbs (e.g. *chuan* 'to put on/wear'). The participant was presented with two pictures on the computer screen and then listened to a sentence that can be played only once. They were asked to indicate which picture best matches the sentence provided by ticking the answer on an answer sheet. If they could not understand the meaning of the sentence, they could choose "I don't know". Two types of sentences (3) were involved (4 tokens for each type). Another eight sentences were added as fillers.

(3)

Type C-1: *zai* + V_{MTS} [+progressive]
Xiao nūhai *zai* *chuan* *xie*.
little girl ASP put on/wear shoe
'The little girl is putting on her shoes.'

Picture Set:

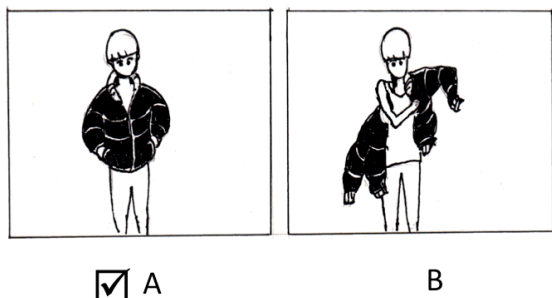


☒ A

B

Type C-2: V_{MTS} -*zhe*_R [+resultant-stative]
Xiaoli *chuan* *zhe* *yi* *jian* *waitao*.
Xiaoli put on/wear ASP one CL coat
'Xiaoli is wearing a coat.'

Picture Set:



c. The sentence completeness judgement task (SCJT)

A sentence completeness judgement task was invented for Question 4, to test whether the participant can differ *zai* from *-zhe* in the tense anchoring feature [+T]. The task was conducted on *Eprime 2.0* and employed a self-paced reading fashion. The participant was presented a sentence by pressing the SPACE bar, in a word-by-word fashion. Each test item started with a plus sign “+” and ends with a string of asterisks “***”, followed by a question page on which the participant was asked whether the sentence can stop here standing as a complete Chinese sentence. The participant was instructed to make a judgement by pressing the ‘√’ key for yes, the ‘×’ key for no, and the ‘?’ key for ‘I don’t know’ on the keyboard. The participant’s choices and thinking times (the reaction times for both the ending page “***” and the question page) were recorded. The former type of data is the main data and the latter acts as a supporting one. Longer thinking times are thought to reflect the participant’s uncertainty and processing difficulties, which may relate to a violation of expectation, the ungrammaticality of the sentence, or a reanalysis process.

It was crucial to control variables in the design of the SCJT. All the predicates of the critical items were activity verbs, which are atelic. Hence the occurrence of the aspect markers is the only factor left, which directly influences the sentence completeness. Six tokens were designed for each marker and divided into two different lists based on a Latin square design. There were 6 critical items (3 tokens for each marker), such as (4), and 34 fillers in one list, with a half being ‘incomplete’ and the other half ‘complete’. The lengths of the critical items were 3-4 words (4-5 characters).

(4)

Type D-1:

XiaoLi zai chang ge. (complete)
 XiaoLi ASP sing song
 ‘XiaoLi is singing.’

Type D-2:

#XiaoLi chang zhe ge. (incomplete)
 XiaoLi sing ASP song
 ‘XiaoLi is singing.’

5. Results

5.1 Results from the acceptability judgement task

In data analyses for the AJT, the ‘I don’t know’ responses were deleted and treated as missing values. The four acceptability ratings were converted into the numerical values 1, 2, 3 and 4, respectively. As 2.5 is at the middle of the scale, mean scores falling between 2 and 3 suggest indeterminacy. Those that reach 3 or above imply acceptance and those lower than 2 are interpreted as rejection. If the mean score of a learner group and that of the native Chinese group fall in the same range (i.e., ≤ 2 , 2-3 or ≥ 3), that learner group’s overall performance was considered to be native-like. The scores were analysed using linear mixed effects (LME) models under *nlme* (Pinheiro et al. 2014) and ANOVA under *lmerTest* (Kuznetsova, Brockhoff, & Christensen, 2017), with Group and Marker as fixed effect factors and Subject and Item as random factors.

Table 5. Mean scores for Type A-1 (*zai* [+durative] + $V_{achievement}$) and Type A-2 ($V_{achievement}$ -*zhe_p* [+atelic])

Group	*Type A-1 <i>zai</i> + $V_{achievement}$			*Type A-2 $V_{achievement}$ - <i>zhe_p</i>
	Mean (SD)			Mean (SD)
Beginner	2.66 (1.00)#	<—>		2.15 (0.92)#
Intermediate	1.96 (0.85)#	<—>		1.73 (0.75)#
Advanced	1.93 (1.01)#	<—>		1.72 (0.78)
NS	1.33 (0.79)			1.24 (0.55)

Note. SD stands for standard deviation; * indicates ungrammatical constructions; # stands for a significant difference from the Native Chinese Group at $p < .05$; <—> stands for a significant difference at 0.05 level between the two values.

The LME indicated that the main effect of Group and that of Marker reached significance (Group: $F = 43.76$, $p < .001$; Marker: $F = 29.69$, $p < .001$) but the interaction effect was not significant ($F = 0.99$, $p = .39$). ANOVA results revealed the groups were significantly different from each other in terms of the mean score in both types (Type A-1: $F(3, 355) = 24.97$, $p < .001$; Type A-2: $F(3, 352) = 27.15$, $p < .001$). Similar to the Chinese natives, the intermediate and advanced groups judged both the *zai* and the -*zhe_p* sentences as unacceptable (mean scores < 2), albeit to a lesser extent (Type A-1: native vs. intermediate: $p < .001$; native vs. advanced: $p = .001$; Type A-2: native vs. intermediate: $p < .001$; native vs. advanced: $p = .098$). The beginner group was indeterminate on the *zai* sentences but tended to reject the -*zhe_p* sentences. Paired-sample *t*-tests were conducted on the data for the two types within each group. The results showed that only the learner groups found the -*zhe_p* sentences significantly more unacceptable than the *zai* sentences (beginner: $t(68) = 2.278$, $p = .026$; intermediate: $t(88) = 2.395$, $p = .019$; advanced: $t(82) = 2.604$, $p = .011$; native: $t(99) = 1.090$, $p = .278$).

Table 6. Mean scores for Type B-1 (*zai* + $V_{\text{accomplishment}}$) and Type B-2 ($V_{\text{accomplishment}}$ - *zhe_P* [+atelic])

Group	Type B-1			*Type B-2
	<i>zai</i> + $V_{\text{accomplishment}}$			$V_{\text{accomplishment}}$ - <i>zhe_P</i>
	Mean (SD)			Mean (SD)
Beginner	3.65 (0.68)	<—>		3.16 (0.98)#
Intermediate	3.55 (0.60)	<—>		3.07 (0.95)#
Advanced	3.50 (0.75)	<—>		2.51 (0.86)
NS	3.68 (0.64)	<—>		2.41 (0.92)

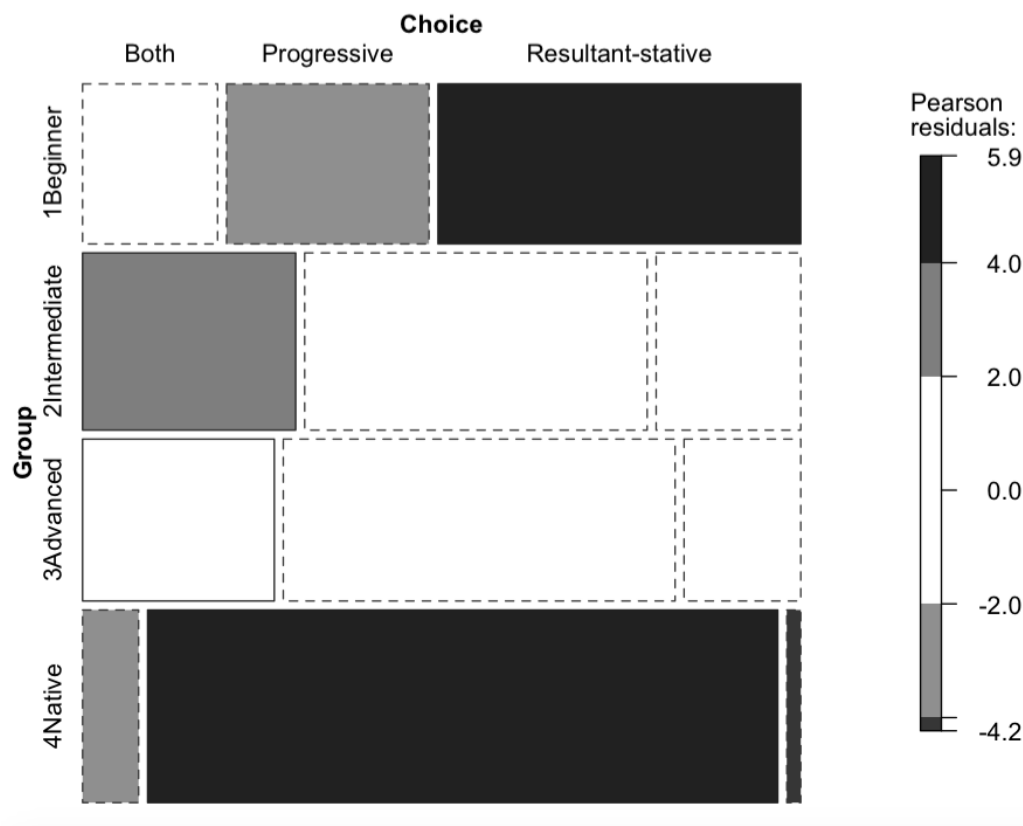
Note. SD stands for standard deviation; * indicates ungrammatical constructions; # stands for a significant difference from the Native Chinese Group at $p < .05$; <—> stands for a significant difference at 0.05 level between the two values.

The LME showed a main effect of Group ($F = 10.63, p < .001$), a main effect of Marker ($F = 209.33, p < .001$) and a significant interaction effect ($F = 12.61, p < .001$). ANOVA results revealed significant differences between the groups in the *-zhe_P* sentences (Type B-2: $F(3, 348) = 14.99, p < .001$) but not in the *zai* sentences (Type B-1: $F(3, 350) = 1.41; p = .24$). As presented in Table 6, similar to the Chinese natives, the three learner groups accepted the use of *zai* with accomplishments (mean scores >3). However, for the association of *-zhe_P* with accomplishments, the advanced learners showed native-like indeterminacy, while the beginners and the intermediate learners tended to accept this type. Paired-sample *t*-tests showed that all the four groups found the *-zhe_P* sentences significantly less acceptable than the *zai* sentences ($ps < .001$).

5.2 Results from the sentence-picture matching task

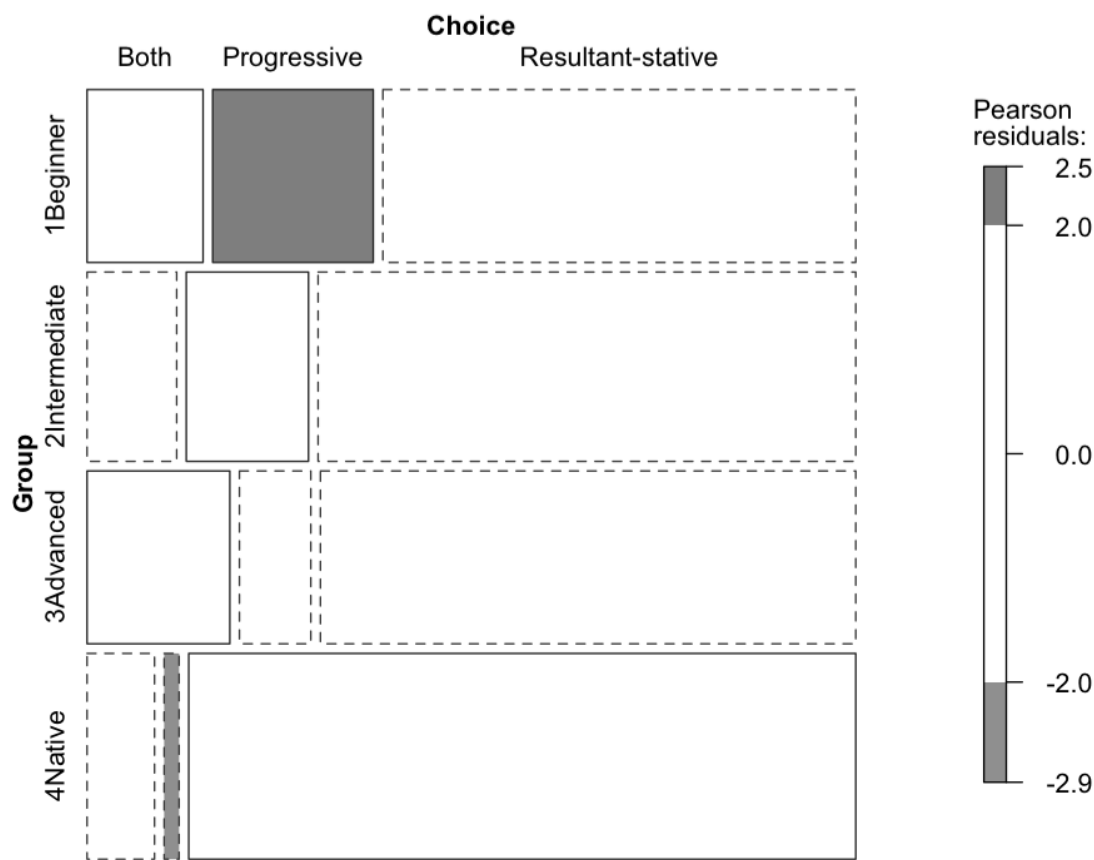
In the SPMT, results are first presented in terms of the distribution of the participants' choices⁸. This task offered participants four choices (Picture A, Picture B, both A and B, and 'I don't know'), which represent different interpretations of the target sentence. Participants' choices were classified into three categories: 'Progressive' for choosing the progressive meaning picture, 'Resultant-stative' for the resultant-stative one and 'Both' for both interpretations, and 'I don't know' choices were deleted and treated as missing values. The interpretive choices were presented through mosaic plots under the *vc*d package (Meyer et al., 2017) in *R*. *Chi*-squared nonparametric tests were further used to compare the participating groups' actual frequencies of aspectual choices. Non-significant *p* values in the *chi*-squared tests are taken as pointing to essentially similar interpretive choices.

Figure 6. Interpretations of the progressive *zai* + V_{MTS} sentences in the SPMT by group⁹



As Figure 6 illustrates in the case of the *zai* sentences, in general, the Chinese natives' data had an overwhelmingly high percentage of the correct progressive interpretation, while the L2 groups did not show the same pattern. The beginner group incorrectly allowed the resultant-stative interpretation of the *zai* sentences at the rate of 71.1% (a combined percentage of 'Resultant-stative' and 'Both') and the percentage of the correct interpretation (progressive) was very low. At both the intermediate and advanced levels, the correct responses accounted for only around half of the total, which shows that indeterminacy on the aspectual meaning of *zai* persisted throughout the developmental stages. *Chi*-square results showed that there was a relationship between Group and Choice ($\chi^2 = 100.52$, $df = 6$, $p < .001$). Moreover, the patterns of the three learner groups were divergent from that of the Chinese natives ($ps < .001$). Among the L2 learner groups, only the patterns of the intermediate and the advanced groups were similar to each other (intermediate vs. advanced: $p = .63$; beginner vs. intermediate: $p < .001$; beginner vs. advanced: $p < .001$).

Figure 7. Interpretations of the resultant-stative $V_{MTS-zhe_R}$ sentences in the SPMT by group



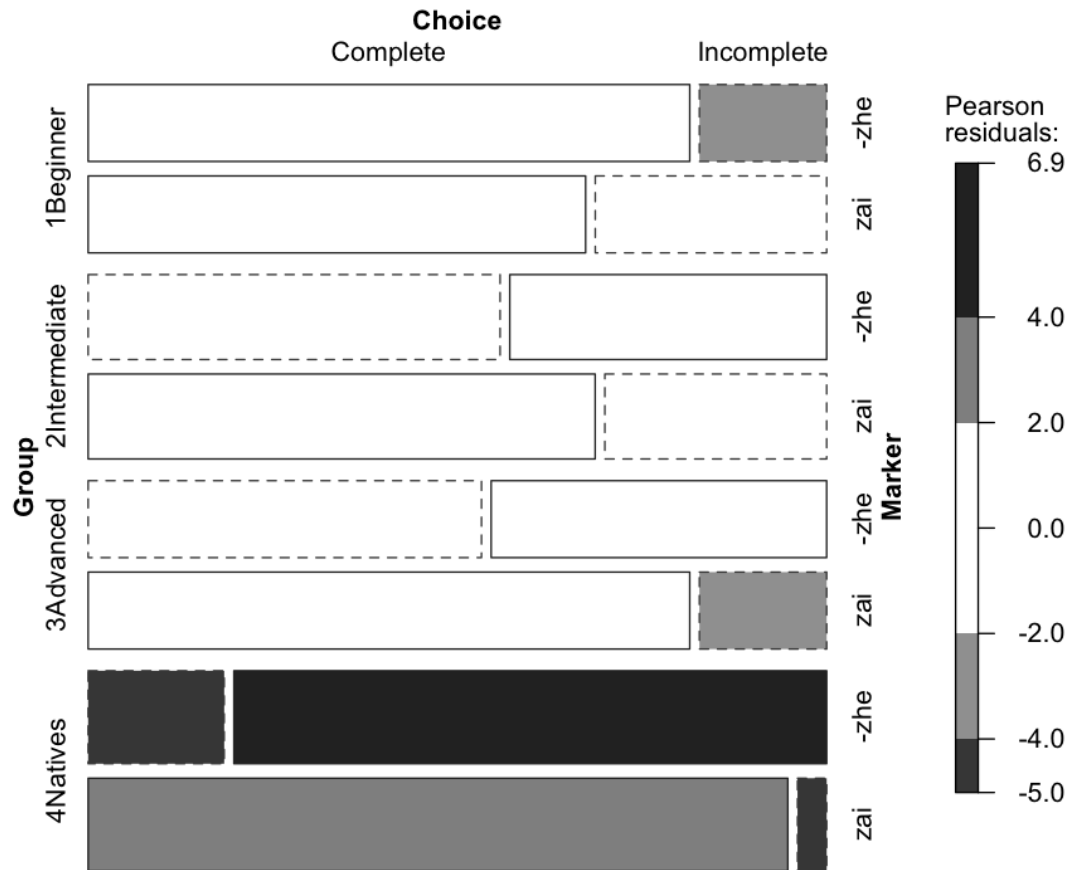
Regarding the interpretation of *-zhe_R* sentences, *chi*-square results indicated that there was a relationship between Group and Choice ($\chi^2 = 20.487$, $df = 6$, $p = .002$). As shown in Figure 7, the correct choice (resultant-stative) accounted for a large proportion of the Chinese natives' choices. The three learner groups showed a similar pattern: from the beginner stage to the advanced stage, the percentages of the correct interpretation were above 60%, which indicates that the L2 learners tended to associate *-zhe_R* with a resultant-stative reading from the beginning. *Chi*-squared tests also showed that the learners' interpretations of *-zhe_R* were significantly different from those of the natives (native vs. beginner: $p < .001$; native vs. intermediate: $p = .002$; native vs. advanced: $p = .05$), while the three learner groups' patterns were not significantly different from each other (beginner vs. intermediate: $p = .47$; beginner vs. advanced: $p = .10$; intermediate vs. advanced: $p = .23$).

An individual analysis conducted for the SPMT found an acquisition asymmetry between *zai* and *-zhe_R*. More L2 learners were able to acquire the interpretation of *-zhe_R* than those who acquired the meaning of *zai* at all proficiency levels: only one intermediate learner and two advanced learners consistently (on 4 out of the 4 tokens) chose the correct interpretation on both the *zai* and *-zhe_R* sentences, and thus were considered to be able to differentiate the aspectual meanings of *zai* and *-zhe_R*.

5.3 Results from the sentence completeness judgement task

For the SCJT, results will first be presented in terms of the participants' judgements on sentence completeness. This task offered participants two choices, which were labeled 'Complete' and 'Incomplete'. The judgement choices were assessed through mosaic plots under the *vcd* package (Meyer et al., 2017) in *R*. *Chi*-squared nonparametric tests were then used to compare learners' and natives' patterns in each condition and compare results of the two types within each group. Non-significant *p* values in the *chi*-squared tests will be taken to point to essentially similar choices. As supporting evidence, the participants' thinking times were also compared. Linear mixed effects models using *nlme* were run on the whole dataset of thinking times (in milliseconds), with Group and Marker as fixed effect factors and Subject and Item as random factors.

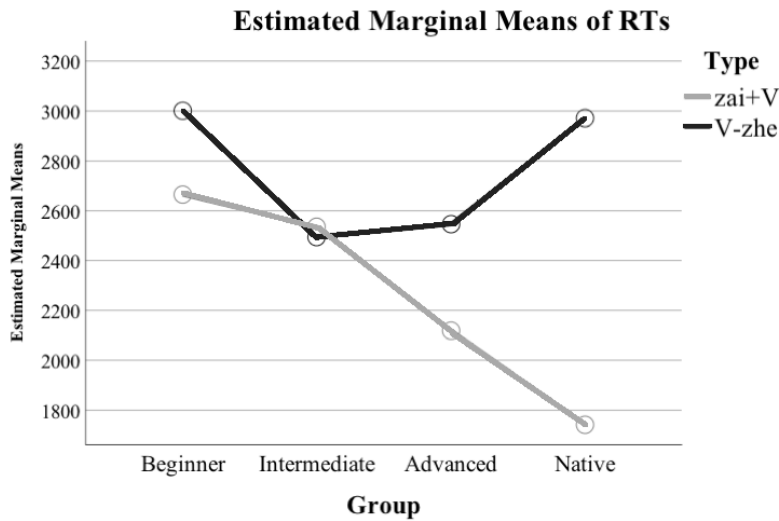
Figure 8. Results of the participants' judgements on the completeness of Type D-1 *zai* + V_{activity} and Type D-2 V_{activity} -*zhe*_p sentences in the SCJT



As shown in Figure 8, only the Chinese natives could correctly judge -*zhe*_p sentences as incomplete and *zai* sentences as complete. Within group *chi*-square tests also showed that they made essentially different judgements on the completeness of the two types (χ^2 (1, $N = 150$) = 91.68, $p < .001$, Cramer's $V = .782$). However, the learner groups behaved differently from the natives, especially on -*zhe*_p. The beginners tended to judge the -*zhe*_p sentences as complete, while both the intermediate and the advanced groups showed indeterminacy (beginner vs. intermediate: $p = .001$; beginner vs. advanced: $p = .001$; intermediate vs. advanced: $p = .768$). For *zai*, the learner groups tended to judge

the *zai* sentences as complete, albeit to different extents. More specifically, the beginners and the intermediate learners behaved similarly, with around one third of responses being “Incomplete” (beginner vs. intermediate: $p = .871$), and the percentage of the correct choice slightly increased at the advanced level (intermediate vs. advanced: $p = .08$). *Chi*-square tests that were conducted within each learner group observed a significant difference between the results of *zai* and *-zhe_p* only in the advanced learners’ data, which suggests that they had some sensitivity to the completeness effects (advanced: $\chi^2(1, N = 126) = 11.867, p = .001$, Cramer’s $V = .307$).

Figure 9. Mean RTs of the four groups on judging the completeness of the *zai* and the *-zhe_p* sentences



The LME found a main effect of Group ($F = 2.85, p = .036$), a main effect of Marker ($F = 14.47, p < .001$) and a significant interaction effect ($F = 4.29, p = .005$). Paired sample *t*-tests were also conducted within each group. There were no significant differences observed between the RTs for the *zai* sentences and those for the *-zhe_p* sentences in the data of the beginner and the intermediate groups (beginner: $t(125) = -1.287, p = .201$; intermediate: $t(138) = 0.168, p = .867$). On the other hand, both the Chinese native and the advanced learner groups spent significantly longer times judging the *zai* sentences than judging the *-zhe_p* sentences (native: $t(149) = -5.029, p < .001$; advanced: $t(125) = -2.053, p = .042$), which can be taken as an indication of sensitivity to the completeness effects.

6. Discussion

The main goal of the present study is to evaluate difficulties in the feature reassembly process when English speakers acquire Chinese imperfective markers. Holding a full transfer position, we assume that English speakers need to reconfigure the feature sets of the Chinese imperfective markers in their L2 by adding or discarding some features. The

L2 patterns observed in the three tasks will be discussed and explained in this section. Answers to the four research questions proposed are summarised in the three topics below.

6.1 Feature adding: learning additional semantic restrictions

As discussed in Section 1, the English and Chinese imperfective markers differ in their interactions with lexical verb classes. The Chinese markers are more complex and impose more restrictions on the predicate, due to the additional features that they carry (i.e. the [+durative] feature of *zai* and the [+atelic] feature of *-zhe_P*). The two additional features exist in both English and Chinese but are not initially assembled on the English marker. Research questions 1 and 2 are to address whether English speakers can add the [+durative] feature and the [+atelic] feature into the feature set of *zai* and that of *-zhe_P*, respectively, which is predicted to be difficult by the FRH.

The AJT results have revealed that the L2 learners were able to correctly reject both the ungrammatical Type A-1 (*zai* [+durative] + V_{achievement}) and Type A-2 (V_{achievement} *-zhe_P* [+atelic]) from the intermediate level. An individual analysis reveals that successful learners emerged at the intermediate stage but the percentages of successful learners remain low at the advanced stage (28.6% for *zai* and 42.9% for *-zhe_P*). In terms of the difference between *zai* and *-zhe_P* in telicity, only the advanced group correctly accepted the Type B-1 (*zai* + V_{accomplishment}) and showed native-like indeterminacy on the Type B-2 (V_{accomplishment} *-zhe_P*). The findings suggest that learning the additional semantic restrictions is difficult but they are ultimately acquirable, which is in line with the FRH.

At this point, we need to explain why the beginners showed indeterminacy on Type A-1 (*zai* [+durative] + V_{achievement}) and Type A-2 (V_{achievement} *-zhe_P* [+atelic]) rather than incorrectly accepting the two types, given the association of the imperfective marker with achievements is allowed in their L1 English. The beginners' pattern seems to be unexpected because if we assume full transfer holds for all the features of lexical items, the grammar should be transferred from English into their L2 Chinese at the initial stage. Some previous studies have also tested the two types of sentence and found a similar learner pattern. For example, Jin (2009) reports that low-intermediate learners in her study rejected both types of sentence, which supports the prediction of the Aspect Hypothesis (Bardovi-Harlig, 1999) that learners do not associate imperfective markers with achievements at the very beginning of acquisition. We argue that it might be too hasty to rule out the transfer effect here. We further examined the beginners' data and the Pearson correlation found a statistical relationship between the AJT and the proficiency scores ($p = .031$). Learners with lower proficiency scores were more likely to judge the two types of ungrammatical sentences as acceptable. This suggests that the beginners' proficiency affected the results and L1 transfer did take place. Some of the beginners were more advanced than the others and had acquired some knowledge of the selectional restrictions of *zai* and *-zhe_P*, and thus they could not represent the initial stage.

We should then turn to explain why learners can acquire the additional semantic features quickly at early stages and why the learning difficulty does not persist to an advanced stage, even though a feature reassembly process is involved. We propose that

this can be accounted for the similarity between the L1 and L2 aspectual operations. In English, the form *be + -ing* is very odd with some achievements, as in (5).

(5) ?Mary was finding her watch. (Smith, 1997, p.172)

For the particular type of achievements, it is difficult to think of the events expressed by the verbs, such as *finding*, as having preliminary stages (Smith, 1997, p.172). Events whose sub-stages before the endpoint are difficult to perceive are not preferred by imperfective marking in English and are completely rejected by Chinese imperfectives due to a semantic clash. The constraint is presumably easy to acquire because it already exists in the learner's L1.

More importantly, the nature of the additional features can account for the findings. The reassembly of [+durative] and [+atelic] is slightly different from the learning situation exemplified in Lardiere (2009). In her analysis, English speakers learning the Chinese plural marker *men* are expected to reassemble [+definite] and [+human] into *men*¹⁰ in their L2 Chinese. The two features are not members of the functional category to which [+plural] belongs ([+definite] on D and [+human] on N), and are posited to be difficult to acquire. On the other hand, in the present study, both [+durative] and [+atelic] are semantic aspectual properties of verb phrases in English, classified as lexical / situation aspect properties. The markers *zai* and *-zhe_P* mainly express grammatical aspect (i.e. imperfective), which is an orthogonal aspectual category to lexical aspect. The two to-be-added features have already existed and been attached to a form that is also associated with the umbrella category Aspect in the L1 English. When learning the additional semantic constraints, English speakers are reconfiguring the features within the functional category Aspect. Our findings suggest that feature assembly within the same functional category would not impose immense difficulties for L2 learners.

6.2 Feature discarding: an arduous process

The sentence-picture matching task was designed to address Question 3, investigating whether English speakers will be able to discard the [+resultant-stative] feature initially transferred into *zai* and the [+progressive] feature initially transferred into *-zhe_R*, and to differentiate *zai* and *-zhe_R* in terms of aspectual meanings. The present study has found that the L2 learners who had no problem accepting both the progressive *zai + V_{MTS}* and the resultant-stative *V_{MTS}-zhe_R* sentences in the AJT but showed asymmetric patterns in the SPMT: they behaved in a more native-like way on *V_{MTS}-zhe_R* than on *zai + V_{MTS}*. Even at the advanced level, the L2 learners remained indeterminate on the reading of *zai*. On the other hand, their interpretations of the resultant-stative *-zhe_R* sentences were similar to those of the natives. The asymmetry results indicate that learners at higher proficiency levels still have difficulty differentiating *zai* and *-zhe_R* in terms of aspectual meanings.

The findings lead to discussion on difficulties brought by different feature reassembly mechanisms, especially by feature discarding. In Chinese, *zai* sentences only receive a progressive reading while the interpretation of *-zhe* sentences depends on the verb type, with the latter case being similar to the aspectual formulation in English. When

learning *zai*, English speakers should completely discard the [+resultant-stative] feature that is transferred from the feature set of *be* + *-ing*. However, for *-zhe*, they do not need to relinquish any transferred viewpoint features but to acquire the interactions between the aspect marker and the verb type (i.e. *-zhe_P* working with common action verbs and *-zhe_R* with the verbs involving a certain attachment meaning), which seems congruent with their L1 imperfective formulations. Then we should ask a question: is this entirely a result of L1 effects? The answer is no. In the SMPT, we strictly controlled the verb type (the MTS verb such as *chuan* “to wear/ to put on”) and ensured the participants involved had fully acquired the semantic meaning of the Chinese MTS verbs by the vocabulary checking. The markers *zai* and *-zhe_R* appear with the same verb and the reading of the sentence completely depends on the aspect marker. Semantic properties of the verb in this case could not help the learner differentiate the aspectual meanings. L1 transfer is insufficient to explain why the learners had difficulty in interpreting *zai*.

We argue that the asymmetric result is attributable to the different learning situations involved. Disassociating a meaning from a certain form may constitute a major difficulty for learners. For related L1 and L2 feature sets, if the learning direction is from a superset to a subset¹¹, it is very difficult for learners to disconfirm the L1-transferred incorrect reading, as learners have to rely heavily on negative evidence in the input. Our finding is echoed by some other empirical studies on L2 imperfectives. For example, Ryu et al. (2015) find that Japanese speakers are more successful in acquiring the Korean imperfective marker *-ko iss-* (for progressive and resultant-stative) than in acquiring the other imperfective *-a iss-* (for resultant-stative only). In the learners’ L1 Japanese, the imperfective marker *-te i-* can express either progressive or resultant-stative, depending on the situation type. Japanese speakers need to disassociate the L1-transferred progressive reading from *-a iss-* in their L2 Korean, which is proved the most difficult. The learning situation and their findings are in line with our argument that discarding a semantic feature from a certain form is arduous.

6.3 L1 transfer effects

Following the FTFA model, we assume that all the features on the L1 imperfective marker are transferred into the L2 at the initial stage. A critical question to ask is what kinds of features are initially bundled in the L1 form. Apart from aspectual values, tense and number features can be attached to the copular verb *be* in English. More specifically, after having detected *zai* and *-zhe* are the counterparts of *be* + *-ing*, do English speakers transfer not only aspect features but tense features into *zai* and *-zhe_P*, given the copular *be* is part of the aspectual marking and always inflected in tense? The sentence completeness judgement task investigating the acquisition of the tense-anchoring feature [+T] of *zai* reveals that the learners tended to find both the *zai* and *-zhe_P* sentences complete at the initial stage and remained indeterminate in judging the *-zhe_P* sentences even at the advanced level. We argue that the beginners’ insensitivity to the incompleteness effects and the apparent asymmetry between the acquisition patterns of *zai* and *-zhe_P* at later stages are attributed to L1 transfer and the learning situation involved.

We believe that the learners initially transferred the tense property attached to the inflection on the copular verb into *zai* and *-zhe_P*, although they may not pin down a

specific tense feature as Chinese is known as a “tenseless” language. The transferred tense property functions similarly to the tense-anchoring feature [+T] in Chinese and plays a facilitative role in the acquisition of [+T] on *zai* at early levels. However, due to the essential but subtle differences between the L1 tense features (grammaticalisation of location in time) and the L2 tense-anchoring feature (tense-anchoring unbounded events), it is very difficult for L2 learners to differentiate the two functions and fully acquire the function of the [+T] feature. Moreover, the learning situation involved here is deleting the transferred tense feature from the feature set of *-zhe_P*, which is also a feature discarding process and predicted to be very hard. There may not be enough informative evidence in the input for learners to disassociate the tense feature transferred from the L1.

The two factors above together account for the result that the advanced learners still showed indeterminacy on the *-zhe_P* sentences, although they correctly judged the *zai* sentences as complete. We do not consider this finding as an indication of a permanent deficiency, because the advanced group cannot represent the end-state grammar and both the judgement and the RT data showed that they had some sensitivity to the difference between *zai* and *-zhe_P* regarding the tense-anchoring function.

7. Conclusions

Chinese imperfective system is more complex than the English system, in terms of both features (meanings) and aspect markers (forms). The present study tests the prediction of the Feature Reassembly Hypothesis by investigating how English speakers reconfigure the feature sets of the imperfective markers *zai*, *-zhe_P* and *-zhe_R* in their L2 Chinese. We have systematically compared the features of the imperfective markers in English and Chinese, and differentiated specific feature reassembly mechanisms that cause varying degrees of difficulty. A grammaticality judgement task, an interpretation task and a sentence completeness judgement task were employed to explore whether L2 learners will be successful in feature configuration by adding new features or discarding L1-transferred features.

Compared to the English *be + -ing*, the Chinese imperfective markers carry more semantic features (i.e. the [+durative] feature of *zai* and the [+atelic] feature of *-zhe_P*) and impose more restrictions on the verb type that they can work with, which requires a feature-adding process. The successful acquisition of the two features implies that the original functional category that the additional feature belongs to in the L1 plays an important role in L2 acquisition. When the to-be-added feature is also associated with the target L2 functional category in the L1, the feature reassembly process is relatively easier for learners.

We have also observed an asymmetry in the acquisition of the interpretations of *zai* and *-zhe_R* and in the acquisition of the incompleteness effect. Most of the advanced learners could not differentiate between *zai* and *-zhe_R* in terms of their aspectual meanings and are not sensitive to the tense-anchoring function. It is very hard for learners to completely delete the L1-transferred [+resultant-stative] feature from *zai* and the transferred tense feature from *-zhe_P*. Our findings suggest that feature discarding

constitutes a major difficulty for L2 learners, as learners have to rely heavily on negative evidence in the input.

Moreover, we have also found some evidence of L1 influence. Both the temporal and aspectual features carried by *be* + *-ing* are transferred into the learners' L2 at the initial stage. The L1-transferred tense features hinder the learners from perceiving the difference between *zai* and *-zhe*_P in terms of the incompleteness effect. The L1 effect persists even at an advanced stage.

Our feature-based study is one of the very first attempts to investigate the development of L2 Chinese imperfective system that involves different detailed feature reassembly mechanisms. More future studies with diverse methods are needed to explore which learning situation poses most problems in bilingual development, and for what reasons.

Declaration of conflicting interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Notes

1. Habitual aspect describes a situation which is characteristic of a whole period (Comrie, 1976) and can be expressed by the Simple Present (e.g. *he eats apples*), by the auxiliary verb *would* in a past tense sentence (e.g. *last year, we would go there*), or by the phrase *use to* (e.g. *we used to go there frequently*). Since the habitual aspect is irrelevant to the Chinese imperfective makers, it will not be discussed in this study.
2. The resultant-stative viewpoint is dubbed as “resultative” in Smith (1997). Since in most accounts resultativity is related to telicity and perfectivity, we adopted Sohn's (2019) term of this aspectual meaning.
3. It has been controversial on the status and function of the particle *zai*: it is treated as a verb (e.g. Chao, 1968), a preposition (e.g. Tai, 1973), an adverb (e.g. Dai, 1997), or conflated with *-zhe* (e.g. Li and Thompson, 1981). The particle *zai* has had a long historical development, appearing first as a locative verb and gradually evolved into a locative preposition and finally into a progressive marker in modern Chinese (Klein et al., 2000). We treat the *zai* immediately followed by a VP as an aspect marker.
4. According to Smith (1997), situations are either durative or instantaneous. Achievements have an inherent endpoint and are instantaneous in nature. Semelfactives (Smith, 1997, p. 29) such as *cough* and *blink*, which refer to single-stage events with no results, are conceptualised as instantaneous as well. Semelfactives do not accept the progressive in English or in Chinese. Sentences like “*ta zai ke-sou*” (he was coughing)

cannot be taken to refer to the ongoingness of a single cough. However, on surface, due to the fact that semelfactives can be construed iteratively, they can work with the progressive markers to indicate a derived, multiple-action activity is ongoing, which is a shifted iterative interpretation.

5. See Tsai (2008, p.682-684) for more details about the three-layered Aspect Phrase model proposed and the difference between *zai* and *zhe* in terms of syntactic positions and generative process.

6. Tsai (2008) put *-zhe_R* on the lowest layer and argues that only the cluster [V-*zhe_R*] may appear in an imperative sentence. We do not consider the ability of constituting an imperative sentence as evidence to support that the aspectual projection of *-zhe_R* is within VP. Chinese imperatives allow phrases that have a resultative meaning such as a resultative compound (e.g. *chi-wan* ‘to eat up’). The semantic feature of *-zhe_R* enables the cluster [V-*zhe_R*] to be an imperative sentence. Moreover, syntactically, *-zhe_R* and *-zhe_P* can work with the same predicate (such as *zhuang qian* ‘to load money into’, *hua zhuang* ‘to put on make-up’). It is more reasonable to argue that the two *-zhes* differ from each other in semantics but not syntax.

7. This is inspired by Domínguez et al. (2011) who summarise two processes in language acquisition: language acquisition = feature selection + feature assembly.

8. Type C-1 (*zai* [+progressive] + V_{MTS}) and Type C-2 (V_{MTS} *-zhe_R* [+resultant-stative]) were also tested in the AJT, which served a screening test for the SPMT. The participants who did not choose “completely acceptable” or “probably acceptable” in four out of the four tokens on the target sentences were excluded (five beginners and intermediate learners).

9. The area of the boxes gives an indication of the proportion to the whole. Results with dotted lines being places where results are less than expected and solid lines those where results are more than expected. The Pearson residuals plot to the right uses saturation to indicate inferences that can be made from the data. Individual cells that violate the assumption of independence are more deeply colored. Residuals above 4 or below -4 indicate a difference that means the null hypothesis that Group and Choice are independent can be rejected, and those between 2 and 4 (and -2 and -4) do not indicate a statistical rejection of the null hypothesis (Zeileis et al., 2007).

10. Following Li (1999), Lardiere (2009) assumes that if a Chinese noun is plural-marked, it must also be definite and human, and the Chinese plural suffixation *men* is tightly associated with the features [+definite] and [+human].

11. The superset/subset relationship here only applies to comparing the feature set of the L1 form and that of the corresponding L2 form and does not refer to the whole grammars.

References

- Andersen R and Shirai Y (1996) Primacy of aspect in first and second language acquisition: The pidgin/creole connection. In: Bhatia TK and Ritchie W (eds) *Handbook Of Second Language Acquisition*. San Diego, CA: Academic Press, pp.527–570.
- Bardovi-Harlig K (1999) Examining the role of text type in L2 tense-aspect research: Broadening our horizons. In: Robinson P and Jungheim N (eds) *Proceedings of the Third Pacific Second Language Research Forum*. Tokyo: PacSLRF, pp.129–138.
- Borer H (1984) *Parametric Syntax*. Foris, Dordrecht.
- Borer H (2005) *Structuring sense. Vol. 2, The normal course of events*. Oxford: Oxford University Press.
- Brinton L (1988) *The Development of English Aspectual Systems: Aspectualizers and Post-verbal Particles*. Cambridge: Cambridge University Press.
- Bybee JL and Dahl Ö (1989) The creation of tense and aspect systems in the languages of the world. *Studies in Language* 13: 51–103.
- Bybee JL, Perkins R and Pagliuca W (1994) *The Evolution of Grammar: Tense, Aspect and Modality in the Languages of the World*. Chicago: The University of Chicago Press.
- Chao Y (1968) *A Grammar of Spoken Chinese*. Berkeley: University of California Press.
- Chen Y (1999) “Shijian Fuci “Zai” yu “Zhe” (Time adverbials *zai* and *zhe*). *Hanyu Xuexi (Chinese Language learning)* 4: 10–14.
- Chin DHJ (2008) A cross-linguistic investigation on the acquisition of Spanish aspect. In: Bruhn GJ, Valenzuela E (eds) *Selected Proceedings of the 10th Hispanic Linguistics Symposium*. Somerville, MA: Cascadilla Press, pp.36–50.

- Chomsky N (1995) *The Minimalist Program*. Cambridge, MA: MIT Press.
- Chomsky N (2005) Three factors in language design. *Linguistic Inquiry* 36: 1–22.
- Choi M and Lardiere D (2006) The interpretation of wh-in-situ in Korean second language acquisition. In: Belletti A et al. (eds) *Language Acquisition and Development: Proceedings of GALA 2005*. Cambridge, UK: Cambridge Scholars Publishing, pp.125–135.
- Cinque G (1999) *Adverbs and Functional Heads: A Cross-linguistic Perspective*. New York: Oxford University Press.
- Dai Y (1997) *Xiandai hanyu shiti xitong yanjiu*. Hangzhou: Zhejiang Educational Press.
- Domínguez LJ, Arche M and Myles F (2017) Spanish Imperfect revisited: Exploring L1 influence in the reassembly of imperfective features onto new L2 forms. *Second Language Research* 33(4): 431–457.
- Dowty D (1977). Toward a Semantic Analysis of Verb Aspect and the English “Imperfective” Progressive. *Linguistics and Philosophy* 1(1), 45-77.
- Duff PA and Li D (2002) The acquisition and use of perfective aspect in Mandarin. In: Salaberry R and Shirai Y (eds) *The L2 acquisition of tense-aspect morphology*. Philadelphia: John Benjamins, pp.417–453.
- Fukuda S (2008) Two syntactic positions for English aspectual verbs. In: *Proceedings of the 26th West Coast Conference on Formal Linguistics*. Somerville, MA: Cascadilla Press, pp.172–180.
- Gabriele A (2009) Transfer and transition in the SLA of aspect. *Studies in Second Language Acquisition* 31: 371–402.
- Gabriele A and William M (2011) Why Some Imperfectives Are Interpreted Imperfectly: A Study of Chinese Learners of Japanese. *Language Acquisition* 18(1): 39–83.

- Gu Y (1995) Aspect licensing, verb movement and feature checking. *Cahiers de Linguistique Asie Orientale* 24(1): 49–83.
- Hanban (2001) *National Syllabus of Graded Words and Characters for Chinese Proficiency*. Beijing: Economic Science Press.
- Huang C, Li Y, and Li Y (2009) *The syntax of Chinese*. Cambridge: Cambridge University Press.
- Izquierdo J and Collins L (2008) The facilitative role of L1 influence in tense–aspect marking: A comparison of Hispanophone and Anglophone learners of French. *Modern Language Journal* 92: 350–68.
- Jin L (2002) Aspect marking in L2 Chinese by English native speakers. In: *Proceedings of the fifth Durham Postgraduate Conference in Thoretical and Applied Linguistics*, University of Durham, UK, pp.58–66.
- Jin L (2009) *The development of aspect marking in L2 Chinese interlanguages (Hanyu zhongjieyu de tibiaoji bianhua guilv)*. Beijing: Foreign Language Teaching and Research Press.
- Jin L and Hendriks H (2003) The development of aspect marking in L1 and L2 Chinese. In: *Working papers on applied linguistics*. Cambridge: Research Centre for English and Applied Linguistics (RCEAL), University of Cambridge, pp.69–100.
- Klein W (2009) How time is encoded. In: Wolfgang Klein and Ping Li (eds), *The Expression of Time*. Berlin: Mouton de Gruyter, pp. 39–82.
- Klein W, Li P and Hendriks H (2000) Aspect and assertion in Mandarin Chinese. *Natural Language and Linguistic Theory* 18(4): 723–770.
- Kuznetsova A, Brockhoff PB, Christensen RHB (2017) lmerTest Package: Tests in Linear Mixed Effects Models. *Journal of Statistical Software* 82(13): 1–26.

- Lardiere D (2008) Feature-assembly in second language acquisition. In: Liceras, J, Zobl, H, Goodluck, H (eds) *The role of features in second language acquisition*. Mahwah, NJ: Lawrence Erlbaum, pp.106–40.
- Lardiere D (2009) Some thoughts on the contrastive analysis of features in second language acquisition. *Second Language Research* 25: 173–227.
- Li YH (1999) Plurality in a classifier language. *Journal of East Asian Linguistics* 8: 75–99.
- Li P and Bowerman M (1998) The acquisition of lexical and grammatical aspect in Chinese. *First Language* 18(54): 311-350.
- Li C & Thompson S (1989) *Mandarin Chinese: A Functional Reference Grammar*. Berkeley: University of California Press.
- Lin J (2002) Aspectual Selection and Temporal Reference of the Chinese Aspectual Marker zhe. *Tsinghua Journal of Chinese Studies* 32 (2): 257–296.
- Lin J (2003) Temporal reference in Mandarin Chinese. *Journal of East Asian Linguistics* 12: 259–311.
- Lin J (2006) Time in a Language Without Tense: The Case of Chinese. *Journal of Semantics* 23: 1–53.
- MacDonald J (2006) *The syntax of inner aspect*, Doctoral dissertation, Stony Brook University.
- MacDonald J (2011) The phrase structure of phase verbs: An initial contrastive analysis of English and Russian. *Acta Linguistica Hungarica* 58(3): 261–276.
- Meyer D, Zeileis A and Hornik K (2017) *vcd: Visualizing Categorical Data*. R package version 1.4-4.

- McManus K (2015) L1–L2 differences in the acquisition of form–meaning pairings: A comparison of English and German learners of French. *Canadian Modern Language Review (La Revue canadienne des langues vivantes)* 71: 51–77.
- Montrul S and Slabakova R (2002) Acquiring morphosyntactic and semantic properties of aspectual tenses in L2 Spanish. In: Pérez-Leroux, AT and Liceras, J (eds) *The acquisition of Spanish morphosyntax: The L1–L2 connection*. Dordrecht: Kluwer, pp. 113–49.
- Montrul S and Slabakova R (2003) Competence similarities between native and near-native speakers: An investigation of the preterite–imperfect contrast in Spanish. *Studies in Second Language Acquisition* 25: 351–98.
- Nossalik L (2010) What exactly does outer aspect encode. In *Proceedings of the 2010 annual conference of the Canadian Linguistic Association*: 1-12.
- Pinheiro J, Bates D, DebRoy S, Sarkar D and R Core Team (2014) *Nlme: Linear and Nonlinear Mixed Effects Models*. R Package Version 3, 1-117.
- Roberts L and Liszka SA (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: 413–39.
- Ryu J, Horie K and Shirai Y (2015) Acquisition of the Korean Imperfective Aspect Markers *–ko iss–* and *–a iss–* by Japanese Learners: A Multiple-Factor Account. *Language Learning* 65: 791–823.
- Salaberry R (2000) The acquisition of English past tense in an instructional setting. *System* 28: 135–152.
- Salaberry R (2008) *Marking past tense in second language acquisition: A theoretical model*. A&C Black.

- Schwartz B and Sprouse R (1994) Word order and Nominative Case in nonnative language acquisition: A longitudinal study of (L1 Turkish) German Interlanguage. In: Hoekstra T and Schwartz B (eds) *Language Acquisition Studies in Generative Grammar*. Amsterdam: John Benjamins, pp.317–68.
- Schwartz B and Sprouse R (1996) L2 cognitive states and the full transfer / full access model. *Second Language Research* 12(1): 40–72.
- Shirai Y (1991) *Primacy of Aspect in Language Acquisition: Simplified input and prototype*. PhD Dissertation, University of California, Los Angeles.
- Slabakova R (2000) L1 transfer revisited: the L2 acquisition of telicity marking in English by Spanish and Bulgarian native speakers. *Linguistics* 38: 739–70.
- Slabakova R (2005) Perfective Prefixes: What They are, What Flavors They Come in, and How They are Acquired, In: *Proceedings of FASL* (2004), pp.324-341.
- Slabakova R (2008) *Meaning in the Second Language*. Berlin: Mouton de Gruyter.
- Slabakova R (2009) Features or Parameters: which one makes SLA easier, and more interesting to study? *Second Language Research* 25(2): 313–324.
- Slabakova R (2001) *Telicity in second language*. Amsterdam: John Benjamins.
- Smith C (1991/1997) *The Parameter of Aspect*. London: Kluwer Academic.
- Sohn H M (2019) *Korean*. Routledge.
- Tang S and Lee T (2000) Focus as an Anchoring Condition. In: *The International Symposium on Topic and Focus in Chinese*, The Hong Kong Polytechnic University, HK, pp.21–23.
- Travis L (1991) *Inner Aspect and the Structure of VP*. Ms., McGill University, Montreal, Que.

- Tsai W (2008) Tense anchoring in Chinese. *Lingua* 118(5): 675–686.
- Tong X (2012) *L2 Acquisition of Mandarin Zai and Le*. BA thesis, Minzu University of China.
- Wang L (2012) Second Language Acquisition of Mandarin Aspect Markers by Native Swedish Adults. *Studia Linguistica Upsaliensia* 12. Uppsala: Acta Universitatis Upsaliensis.
- Wen X (1997) Acquisition of Chinese Aspect: An Analysis of the Interlanguage of Learners of Chinese as a Foreign Language. *Review of Applied Linguistics* 1–26.
- Woo I (2015) Aspectual coercion and the aspectual marker -zhe in Mandarin Chinese. *International Journal of Linguistics and Communication* 3(2): 119–134.
- Xiao R and McEnery T (2004) *Aspect in Mandarin Chinese: A Corpus-based Study*. Amsterdam: John Benjamins.
- Yang S, Huang Y and Sun D (1999) The Acquisition of Aspectual Markers in Chinese as a Second Language. *Journal of Chinese Language Teachers Association* 34(1): 31–54.
- Yuan B and Dugarova E (2012) Wh-topicalization at the syntax-discourse interface in English speakers' L2 Chinese grammars. *Studies in Second Language Acquisition* 34: 533–560.
- Zeileis A, Meyer D and Hornik K (2007) Residual-based shadings for visualizing (conditional) independence. *Journal of Computational and Graphical Statistics*, 16(3), 507-525.
- Zhu D (1982) *Yufa jiangyi*. Beijing: Shangwu Yinshuguan.