THE PROCESSING OF ASPECTUAL VERBS IN MANDARIN CHINESE

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ABSTRACT

Research in the past few years has investigated the processing costs for sentences such as *John began/enjoyed the book*. Much of this work has conflated sentences with aspectual verbs, like *start* or *finish*, with psychological verbs, like *enjoy* or *tolerate*. However, some studies have reported greater costs for aspectual verbs compared to psychological verbs (e.g., Katsika et al., 2012; Lai et al., 2017), which led to a processing model of aspectual verbs in English, i.e., the *Structured Individual Hypothesis* (SIH). SIH proposes that aspectual verbs lexically encode a function whose value (dimension) must be resolved. This ambiguity resolution is hypothesized to occur at the verb's complement, where a specific dimension is selected based on context (Piñango & Deo, 2016). Recent research (Lai et al., 2017; Lai, Braze, & Piñango, 2023) has examined SIH, however, mixed effects at aspectual verbs were found in English and they did not explicitly argue for a processing effect at the verb itself. In light of the critical role of the context in SIH, recent research (Lai and Piñango, 2023; Lai, Braze, & Piñango, 2023) has investigated how the interpretations of sentences with aspectual verbs were affected by biased contexts in an offline sentence acceptability judgment study and an online eye-tracking study. However, results of the two studies showed that biased contexts disambiguated the interpretations of aspectual verb expressions offline while processing costs in biased contexts were not found to attenuate costs in real time. It is not clear yet why conflicting results were found.

This dissertation reports two studies on the processing of aspectual verbs in Mandarin. The first eye-tracking study investigated the costs of processing aspectual verbs and psychological verb in Mandarin Chinese. The results revealed greater costs both for aspectual verbs compared to controls and for aspectual verbs compared to psych verbs, reinforcing the claims of the SIH cross-linguistically (Piñango & Deo, 2016). Strikingly, there was an early

effect at the verb for aspectual verbs but not for psychological verbs. We argue that this result, together with previous findings and other conceptual issues, necessitates a conservative modification of the SIH: aspectual verbs are semantically more complex than pschychological verbs. This modification retains the core analysis underlying the SIH, but reconciles the SIH with experimental findings by bringing it in line with the view that lexical semantic complexity has immediate consequences in processing (e.g., Brennan & Pylkkänen, 2010).

The second study investigated context effects in the processing of aspectual verbs in Mandarin. The reason why conflicting results were found offline versus online in early studies and the time course of context effects remain unclear, but in the view of this dissertation, it may be due to pragmatic contexts, i.e., descriptions of the utterance context. We used grammatical contexts – two classes of adverbs – in two offline interpretation tasks and a self-paced reading experiment to examine context effects for sentences with aspectual verbs in Mandarin. We found that biased grammatical contexts not only affected the interpretations in the offline tasks, but crucially facilitated processing in the online experiment as well. We conclude that biased grammatical contexts can *predetermine* the interpretations of aspectual verb expressions immediately in real time.

In sum, this dissertation shows that the semantic complexity as found in aspectual verbs in Mandarin can be processed immediately when it is encountered, and the contextual facilitation of the processing of semantically complex expressions can occur in real time.

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CHAPTER 1. INTRODUCTION

1.1 Overview

In this dissertation, I aim to answer the following questions: How do people comprehend expressions that are semantically complex? How and when do contexts affect the processing of semantic complexity? To answer these questions, I investigated the semantic complexity effects and context effects in the processing of certain verb expressions. More specifically, I investigated how expressions such as *John began/enjoyed the book* are comprehended.

Verb expressions such as *began/enjoyed the book* were found to be costly to process in previous literature. This result was analyzed as a type shift of the complement such that the type of the complement (e.g., *the book*) was coerced to be shifted from an entity (e.g., *the book*) to an event (e.g., *reading the book*) (McElree et al., 2001; Traxler et al., 2002; Traxler et al., 2005). This account was challenged by the finding of distinct processing patterns when the verbs were examined separately based on the semantically isolable verb classes they belonged to. Processing costs were found to be only associated with aspectual verb expressions (e.g., *began the book*) but not with psychological verb expressions (e.g., *enjoyed the book*) (Katsika et al., 2012; DiNardo, 2015; Lai et al., 2017). This finding led to a hypothesis regarding the complexity of aspectual verbs, i.e., the Structured Individual Hypothesis (SIH), which posits that aspectual verbs are semantically ambiguous due to their lexically underspecified representations. On this hypothesis the associated processing costs came from the exhaustive retrieval of the underspecified representations and the ambiguity resolution determined by the context (Piñango & Deo, 2016; Lai et al., 2017; Lai et al., 2023).

Given that the aspectual verb class could be complex in semantics and its processing could be dissociable from syntax, by investigating how aspectual verb expressions are encoded

in our brain, this dissertation sheds light on the real-time comprehension of semantic complexity and the time course of context effects in semantic interpretation. In addition, this dissertation explores aspectual verb expressions cross-linguistically in Mandarin, which sheds light on the sematic typology for aspectual verbs.

1.2 The domain of investigation: aspectual verb expressions in Mandarin

Aspectual verbs represent relations between a reference time and event type of the complement in the verb phrase, which could introduce the initiation of an event (*start, begin*), the cessation of an event (*finish, complete, end*) or the continuation of an event (*continue*) (ter Meulen, 1990). Aspectual verbs often take event-denoting complements, as in *John finished the speech*, where the verb *finished* introduces the end of a speech event denoted by the complement and such a verb phrase is easy to process (Traxler et al., 2005). However, when we consider entity-denoting complements, the processing of the verb phrase becomes costly (Katsika et al., 2012; Lai et al., 2017). So, the domain of investigation in this dissertation focuses on aspectual verb expressions taking entity complements in Mandarin.

In this dissertation, two studies on aspectual verbs in Mandarin are reported. In the first study (Chapter 3), I investigated the real-time processing of two types of aspectual verbs and psychological verbs. The first type of aspectual verbs in Mandarin behaved similarly to those in English such as *finish, continue, and complete*. Sentences like *John finished the book* in English allow two readings, one called the agentive reading as in *John finished reading the book*, and the other one called the constitutive reading as in *John was the last character in the book.* With this first type of aspectual verbs in sentences, two readings were also acceptable in Mandarin. The second type of aspectual verbs, including *rush* and *postpone* in Mandarin, which can take entity-denoting complement such as *rush the essay*. In contrast to the first type, the second type only

permits one reading, the agentive reading as in *John rushed writing the essay*. By comparing the processing patterns of the two types of aspectual verbs with psychological verbs, this study explores the real-time semantic complexity effects in aspectual verb expressions in Mandarin.

In the second study (Chapter 4), I investigated context effects in aspectual verb expressions in Mandarin. Previous studies found that biasing contexts constrained the interpretation of aspectual verb expressions in an offline questionnaire study, but no such effect was found in an online eye-tracking study (Lai & Piñango, 2019; Lai et al., 2023). Given the conflicting results, a puzzle arose regarding how exactly the context affects the comprehension of aspectual verb expressions. To investigate this puzzle from both offline and online perspectives, three experiments were conducted in this study, including an acceptability judgement task, a self-paced reading experiment, and an acceptability judgement post-test. Regarding the type of contexts, differentiating from the pragmatic contexts used in previous studies (*i.e., pairs of context sentence and target sentence*), I created grammatical contexts by using adverbs in Mandarin. The rationale behind this choice was that different adverb usage led to different interpretations of sentences with aspectual verbs. The intuitions in Mandarin were that when there was no adverb in a sentence as in *SHI Yuehan LAI kaishi zhe bu wenxue zuopin (It is John who begins the literature)* or when there was a speaker-oriented adverb (*e.g., surprisingly*) in a sentence as in *SHI Yuehan lingrenjingyade LAI kaishi zhe bu wenxue zuopin (It is John who surprisingly begins the literature)*, both the agentive reading and the constitutive reading were acceptable. By contrast, when there was a mental-attitude adverb (*e.g., reluctantly*) in the sentence as in *SHI Yuehan buqingbuyuande LAI kaishi zhe bu wenxue zuopin (It is John who reluctantly begins the literature)*, only the agentive reading was acceptable. So, the grammatical contexts in this study were further subdivided into a biasing context, which was

created by the use of mental-attitude adverbs and a non-biasing context which was created by not using adverbs or the use of speaker-oriented adverbs. By investigating the processing of aspectual verb expressions in various contexts, I answer the following questions: Does the grammatical context affect the offline processing of the semantically complex aspectual verb phrases? Does adverbs as the grammatical context affect the processing of the aspectual verb expressions in real time? If so, what is the timing of the grammatical contextual modulation in semantic interpretations?

1.3 Outline of the dissertation

In Chapter 1, I introduce the research questions, the domain of investigation and the outline of this dissertation.

In Chapter 2, I review various accounts of the processing costs associated with expressions like *John began/enjoyed the book* as well as the challenges to those accounts. Furthermore, I review a processing model that was constructed based on the finding of processing costs associated with aspectual verbs in English, namely the SIH, which claims that the costs come from the exhaustive lexical retrieval and the ambiguity resolution.

In Chapter 3, I investigate the processing of two types of aspectual verb and psychological verbs in Mandarin. These verbs show different patterns of real-time processing such that only aspectual verbs like *finish, continue,* and *complete* in Mandarin are difficult to process. In addition, processing costs are observed to occur immediately when the verbs are encountered. The processing of the other type of aspectual verb, exemplified by *rush* and *postpone*, and also of the psych verbs in Mandarin is not costly. Results indicate that the processing of semantic complexity is activated immediately in real time.

In Chapter 4, I investigated grammatical context effects of aspectual verb expressions in Mandarin from both offline and online perspectives. Adverbs in Mandarin were used to create grammatical contexts, with mental-attitude adverbs as the biasing context and speaker-oriented adverbs/no adverbs as the non-biasing context. Results of the offline questionnaire studies show that the biasing context constrains the interpretation of aspectual verb expressions while the non-biasing context does not. Results of the self-paced reading study show that aspectual verb expressions in the biasing context are easier to process compared to those in the non-biasing context online, which is consistent with the offline finding. The overall findings indicate that the grammatical context affects semantic interpretation not only in offline tasks but also immediately in real time.

In Chapter 5, I summarize the key findings of this dissertation. I discuss the contributions of this dissertation and make recommendations for future research.

CHAPTER 2. THE SEMANTIC COMPLEXITY OF ASPECTUAL VERBS

In this chapter, I will review various processing models and accounts of the sentences in question such as *John began/enjoyed the book* proposed by early studies. I will also discuss the challenges and unsolved problems in these accounts.

2.1 Type-shifting and enriched composition

The meaning of an entire sentence depends on the meaning of each unit and how these units are combined. From a linguistic perspective, this process is called compositionality (Partee, 1995). The meaning of an expression is constructed by combining the meaning of the constituent parts based on rule-governed syntactic structure (Partee, ter Meulen, & Wall, 1990). Taking the sentences in (2.1) as an example, in (2.1a), the complement *the essay* is an entity and the theme of the verb phrase, and *the student* is the agent. The semantic interpretation of (2.1a) is that there is something, *the essay*, being written and the writer was *the student*. The sentence is constructed following the principle of compositionality. In (2.1b), there is an aspectual verb, *finished*, referring to the temporal end of an event, which is *writing the essay*. The semantic interpretation is that an event (*writing the essay*) came to an end, and the agent who brought things to an end was *the student*. Again, the semantic interpretation is transparently composed.

(2.1) a. The student wrote the essay.

b. The student finished writing the essay.

c. The student finished the essay.

When it comes to (2.1c), problems arise when we construct the meaning. The aspectual verb *finished* combines with an entity complement rather than an event complement. However, we can still perfectly interpret this sentence; it can be readily paraphrased with the same meaning as (2.1b), writing, or perhaps reading, the essay. The meaning of writing or reading does not

originally exist in (2.1c) but is supplied through a process of interpretive enrichment; therefore, such composition has been called enriched composition (Jackendoff, 1997).

Sentences like (2.1c) have been investigated over the past two decades ever since an influential study by McElree et al. (2001). They conducted a self-paced reading study on sentences as in (2.2) and found processing costs in sentences like (2.2a).

(2.2) a. The author was starting the book in his house on the island.

b. The author was writing the book in his house on the island.

c. The author was reading the book in his house on the island.

(McElree et al., 2001)

The reading times of sentences like (2.2a) were compared with the reading times of plausible and preferred sentences like (2.2b) and plausible but non-preferred sentences like (2.2c). Results of this study indicated longer reading times at the Noun (*book*) for sentences like (2.2a) and (2.2c) compared with (2.2b). However, at the word following the Noun (*in*), the distinction between sentences like (2.2c) and (2.2b) disappeared while longer reading times were sustained for sentences like (2.2a) compared with (2.2b).

Similar processing costs were found in an eye-tracking study (Traxler, Pickering, and McElree, 2002). In the first experiment with same conditions as used in McElree et al. (2001), processing costs were found at the regions of interest (ROIs) of Verb, Noun Phrase (NP), and two words following the NP. At the Verb region, Traxler, Pickering, and McElree (2002) found longer second-pass and total times for sentences like (2.2a) compared with sentences like (2.2b) and (2.2c), indicating that participants spent more time in reading and re-reading the verb in the sentences like (2.2a) compared with preferred and non-preferred sentences. At the NP region, significantly more first-pass regressions were found for (2.2a) compared with the preferred

condition, indicating that participants read the NP again. Longer total times for (2.2a) were also found at the NP compared with the other two conditions. At the Post-NP region, longer second-pass and total times were found for (2.2a) compared with the other two conditions.

In Traxler, Pickering, and McElree (2002)'s second experiment, they investigated sentences with entity complements compared with ones with event complements as in (2.3). Processing costs were only found in sentences with *Event Verbs* followed by entity complements.

(2.3) a. The boy started the fight after school today.

b. The boy saw the fight after school today.

c. The boy started the puzzle after school today.

d. The boy saw the puzzle after school today.

(Traxler, Pickering, and McElree, 2002)

Significantly longer reading times were found in late processing, i.e., in second-pass and total time, for condition (2.3c) compared with condition (2.3d) and condition (2.3a). The results suggested that participants encountered difficulties in processing sentences with the combination of the so-called *Event Verbs* such as those in (2.4) combined with entity complements (for example, *the puzzle*). But no such difficulties were found when participants read sentences with *Event Verbs* combined with event complements.

(2.4) the so-called *Event Verbs* used in Traxler, Pickering, and McElree (2002):

start, begin, enjoy, complete, endure, prefer, expect, end, finish

One explanation for these effects has involved an appeal to type-shifting theory (Partee and Rooth, 1983; Jackendoff, 1997). According to the type-shifting account, verbs like *finish* require an eventive complement. If there is a mismatch of type between the verb's selection

requirements and the type of its complement, it gives rise to a difficulty in interpreting the sentence. The resolution is affected by shifting (or *coercing*) the entity to an activity or event in order to meet the semantic restrictions of the verb (Jackendoff, 1997). The choice of event is affected by the semantic and pragmatic information related to the verb and its subject, as well as the discourse context.

Generally consistent with this view, Pustejovsky (1995) proposed that the lexical representation of the entity-denoting complement has a qualia structure including telic and agentive properties. Telic properties describe the function or the purpose of the entity while agentive properties describe how it is created (Pustejovsky, 1995). Taking *the essay* as an example, its telic structure has two arguments, one being the subject of the verb and the other being itself. The function of *the essay* is to be read so the verb in the telic structure is *read*. The agentive structure also has two arguments, but *the essay* is created by the activity of writing so the verb in the agentive structure is *write*. Thus, the operation of type-shifting is affected by the qualia structure of the complement of the verb.

Traxler et al. (2005) furthermore argued that the processing costs originated from the build-up of a representation for the *event sense* of the complement and proposed the processing operations in (2.5).

(2.5) Operations of processing the enriched composition such as *began the book* (Traxler et al., 2005, p. 4):

a. Access the lexical entry of the complement and integrate its stored senses into the semantic representation of the full sentence.

b. Detect the type mismatch between the verb's requirement and the complement and trigger the coercion computation.

c. Infer a plausible event sense of the complement based on properties associated with the complement noun and the discourse.

d. Reconfigure the complement from an entity to an event to incorporate the event sense into the semantic representation of the verb phrase.

Results of the eye-tracking study indicated processing costs due to the enriched composition which, it was claimed, were caused by the operations involved in building a representation for the *event sense* of the complement (Traxler et al., 2005)

2.2 The Unification Account and the Surprisal Account

Type-shifting and coercion constitute one influential account of the processing costs associated with expressions such as *begin/ enjoy the book*, but there have been other proposals, such as a 'unification' account (Baggio et al., 2010) and a 'surprisal' account (Delogu, Crocker, & Drenhaus, 2017), among others.

Baggio et al. (2010) conducted an ERP experiment using coercion sentences, semantically anomalous sentences, and neutral sentences such as those in (2.6).

(2.6) a. The journalist began the article before his coffee break.

b. The journalist astonished the article before his coffee break.

c. The journalist wrote the article before his coffee break.

(Baggio et al., 2010)

The target verbs they used for the coercing condition, as in (2.6a), were similar to those used in previous studies (Traxler et al., 2002, 2005) as in (2.7)

(2.7) The so-called *Coercing Verbs* used in Baggio et al. (2010):

begin, finish, start, try, attempt, master, endure, complete, enjoy, manage, resist

They found an N400 at the Noun (article) in the coercing condition (2.6a) and the anomalous condition (2.6b) compared with the neutral condition (2.6c), with a central-parietal distribution. In a later time window (700 ms from the onset of the noun – 1000 ms), a distinct effect was found in the coercing condition such that a negative-going shift with a central scalp distribution was evoked compared with the neutral condition. No significant difference between the anomalous condition and the neutral condition appeared in this late time window. They hypothesized that the late negativity found in the coercing condition should be a sustained effect of the N400 evoked in the 300 ms – 550 ms time window.

Since Baggio et al. (2010) ruled out the potential effect caused by event sense ambiguity, the explanation regarding building up an appropriate event sense proposed by Traxler et al. (2005) was not able to account for the processing costs observed in this study. Baggio et al. (2010) conducted a fill-in-the-blank test in which participants were asked to fill the blank with verbs in sentences such as *The journalist began ____ the article before his coffee break,* and 75% of the respondents selected the same event sense as they reported. So, they argued that their ERP results supported a unification-based theory of tense, aspect, and event structure, called the Event Calculus (van Lambalgen & Hamm, 2004). In the representation of the Event Calculus, at time *t*, an event such as *begin* initiates an activity *a* unified with world knowledge or the discourse context (Baggio et al., 2010). Therefore, the unification account modeled the computation of expressions such as *began the book* in a noncompositional way in which participants made an extra step of inference to unify the variable *a* with a suitable activity such as *reading/writing the book* based on world knowledge or the discourse context. The processing costs of expressions like *began the book* were due to the extra inference step which made the unification more complex than expressions like *wrote the book*.

Later, Delogu, Crocker, & Drenhaus (2017) investigated these language phenomena from a different perspective which was based on the Surprisal Theory. They hypothesized that the processing difficulty of the coercing expressions was due to the low predictability (the surprisal) of the complement. To test this hypothesis, they designed three conditions including a coercion condition, a preferred condition, and a congruent control condition, as in (2.8).

(2.8) a. coercion: John began the book.

b. preferred: John read the book.

c. congruent control: John bought the book.

As reported in Delogu, Crocker, & Drenhaus (2017), the predictability of the noun (*book*) in the coercion condition (2.8a) was significantly lower than in the preferred condition (2.8b), but similar to the predictability in the congruent control condition (2.8c). Under the type-shifting account, Delogu, Crocker, & Drenhaus (2017) claimed that it was predicted that the coercion condition should be the most costly one among the three, because only (2.8a) should incorporate an event sense in the verb phrase.

However, under the surprisal account, they predicted that the processing costs in the coercion condition and the congruent control condition should not be significantly different compared with each other, but the costs in both conditions should be significantly larger than in the preferred condition because the predictability of (2.7a) and (2.7c) was distinguished from that of (2.7b). In the eye-tracking experiment in Delogu, Crocker, & Drenhaus (2017), results for total time at the noun were consistent with the prediction under the type-shifting account in that participants spent more time (in total) reading the noun region in the coercion condition than in the preferred condition and the congruent control condition, while results for total time at the verb and for regression-path time at the post-noun region were consistent with the prediction

under the surprisal account. Participants spent more time (in total) reading the verb and had more eye fixations from the first time entering the post-noun region from the left border till exiting from the right border in both the coercion condition and the congruent control condition, compared with the preferred condition.

Delogu, Crocker, & Drenhaus (2017) also conducted an ERP experiment, in which they found the N400 was evoked in the coercion condition and the congruent condition compared with the preferred condition in the 300ms – 500 ms time window, but no sustained negativity in the 700 ms – 100ms, of the sort reported in Baggio et al. (2010), was found in this study. Therefore, Delogu, Crocker, & Drenhaus (2017) concluded that the processing difficulty of expressions like *began the book* came from the contextual likelihood of the noun.

2.3 Different Processing Costs for Aspectual Verbs and Psych Verbs in English

Common to all the aforementioned studies is that they included not only aspectual verbs (like *begin, start, continue, finish, end*) but also a range of other verbs, some of which might be characterized as psychological (henceforth *pysch*) verbs (such as *enjoy, prefer, tolerate, resist, endure, savor*). The choice to use these verbs was based on an intuition that they can all take entity-denoting complements which can be paraphrased as event-denoting complements.

However, Katsika et al. (2012) sought to investigate whether all of the verbs used in previous studies in fact behaved the same way. They conducted an eye-tracking study in which they investigated verbs separately based on their classes for the first time. They divided the verbs used in previous studies into two classes, i.e., aspectual verbs and psych verbs, compared with neutral verbs (entity-denoting verbs) as in (2.9).

(2.9) a. Aspectual: begin, start, finish, continue, complete

b. Psychological: enjoy, tolerate, resist, prefer, favor, stomach, face

c. Entity-denoting: trash, submit, write, misplace, shred, shelve, etc.

(Katsika et al., 2012, p.63)

Katsika et al. (2012) gave a clear definition of the two verb classes. Aspectual verbs are verbs that are "inherently temporal in that their meaning introduces existential quantification over some event whose (initial, medial, or final) subpart is referred to by the VP containing the verb (ter Meulen, 1990)" (Katsika et al., 2012, p.61). They made a clarification for the first time that all the psych verbs used in this study (and in previous studies) were *subject experiencer verbs* and "their external argument is an experiencer while their object argument (the complement) is entailed to be either a target of emotion or subject matter of emotion (Pesetsky, 1996, pp. 55–69)" (Katsika et al. 2012, p.61). They created stimuli based on verb classes and investigated effects of eye movements in various regions of the sentences as in (2.10). Among all ROIs, region 2 included the verb and one word of the NP complement; region 3 included another word of the NP complement and a word following the complement; region 4 included two words following region 3; region 5 included the remaining words till the end of the sentence.

(2.10) ROIs in Katsika et al. (2012):

Aspectual Condition: (Region 1) *Alexandra was* (Region 2) *completing a sci-fi* (Region 3) *book when* (Region 4) *the secretary* (Region 5) *announced the meeting.*

Psych Condition: (Region 1) *Alexandra was* (Region 2) *enjoying a sci-fi* (Region 3) *book when* (Region 4) *the secretary* (Region 5) *announced the meeting.*

Control Condition: (Region 1) *Alexandra was* (Region 2) *shelving a sci-fi* (Region 3) *book when* (Region 4) *the secretary* (Region 5) *announced the meeting.*

Effects were found in the aspectual condition compared with the psych condition and the control condition for second-pass time in region 2, for first-pass regression in region 3, and regression-

path duration in region 5, indicating that participants made more regressive eye fixations and spent more time rereading regions 2, 3, and 5 when they encountered sentences with aspectual verbs. However, participants were not found to have difficulties in processing sentences with psych verbs.

This was a surprising finding because previously it had been assumed that verbs taking entity-NP complements behaved in the same way. Katsika et al.'s findings were subsequently afforded some degree of support in a corpus-based study carried out by Utt et al. (2013), who found a stronger preference for eventhood with respect to verbs in the aspectual class compared to verbs in the psychological class. They found that aspectual verbs had a stronger bias for event-denoting complements compared with psych verbs. The findings in Katsika et al. (2012) and Utt et al. (2013) that aspectual verbs and psych verbs behaved differently challenged all aforementioned accounts which were proposed based on empirical results obtained by investigating verbs that were grouped together regardless of verb classes.

2.4 The *Structured Individual Analysis*

Following the finding indicating there was a clear verb class difference in the processing of coercing verbs (Katsika et al., 2012), Piñango & Deo (2016) articulated several challenges that confront the type-shifting account. The first challenge is the most obvious one: coercion and type-shifting cannot explain the fact that aspectual and psych verbs behave differently.

A second challenge, Piñango & Deo (2016) argued, is that aspectual verbs do not exclusively select for event-denoting complements, as we see in *John finished the book*, where book is an entity, but an adequate paraphrase of this sentence is *John finished reading/writing the book*. In order to arrive at this interpretation, semantic composition must add a *reading/writing* event which does not overtly exist in the meanings of the individual words or in the syntax that

combines them. The aspectual verb *finished* refers to the temporal end of the event *reading/writing the book*, of which *John* is the agent and *the book* is the theme. This interpretation is called the agentive reading of a sentence containing an aspectual verb and an entity-denoting complement.

(2.11) a. A thunderstorm began the morning.

b. The chapter on global poverty begins the book.

(Piñango & Deo, 2016)

However, when the subject is inanimate, as in (2.11), there is no event at issue, and therefore, no agentive reading available. Interestingly, when the subject is animate, the agentive reading is not the only interpretation that is available to native English speakers. Another acceptable interpretation of *John finished the book* is that *John was the last character in the book*, which is called the constitutive reading. In this reading, *John* is not an agent of an event but a subpart of the content of the book; thus, there is no need to add an event like *reading/writing* in the interpretation.

This phenomenon of more than one interpretation being available suggests that sentences containing aspectual verbs have underspecified representations in their composition under certain circumstances (Piñango and Deo, 2016). In order to investigate why and how people can access multiple interpretations in these kinds of sentences, Piñango and Deo (2016) proposed the *Structured Individual Analysis* of aspectual verbs.

The *Structured Individual Analysis* (Piñango and Deo, 2016) claims that aspectual verbs select for structured individuals as their complement rather than events. A structured individual refers to an entity that can be mapped onto a one-dimensional directed path structure, along various dimensions such as spatial, temporal or informational (Piñango and Deo, 2016).

Aspectual verbs are lexically encoded for functions corresponding to these dimensions such as $f_{spatial}$, $f_{temporal}$ or $f_{informational}$, which realize the mapping process mentioned above.

Taking the denotation of *begin* in (2.12) as an example, the presupposition is that the complement of *begin* is a structured individual involving a certain function f_c determined by context.

(2.12) $[\![\text{begin}]\!] = \lambda x \lambda y$: struct-ind$_{fc}$(x). $\exists f'[f'(y) <_{\text{small-initial}} f_c(x)]$

(Piñango and Deo, 2016, p. 379)

The denotation of *begin(x)(y)* is defined only if *x* denotes a structured individual. If defined, the denotation of *begin(x)(y)* is true if, and only if, there exists a function *f'* such that *f'(y)* is a small initial part of $f_c(x)$.

Taking sentence (2.13) as another example, the denotation of *began(the book)(the chapter on poverty)* is defined only if *the book* denotes a structured individual. If defined, (2.13) is true if, and only if, there is a way of mapping *the chapter on poverty* to the initial part of (the structured individual denoted by) *the book*. One way to satisfy these conditions is to construe *the book* along an informational dimension ($f_{informational}$), and hence interpret *the chapter on poverty* as the informationally initial part of *the book*, i.e. as the first chapter of the book.

(2.13) The chapter on poverty began the book.

2.5 The *Structured Individual Hypothesis*

Based on the *Structured Individual Analysis*, Piñango and Deo (2016) proposed the *Structured Individual Hypothesis* (SIH) which takes a perspective on the real-time processing of sentences with aspectual verbs. Piñango and Deo (2016) proposed two sources of processing costs in sentences with aspectual verbs. The first source is the exhaustive activation of all dimension functions at the aspectual verb. Under such an assumption, no matter which specific

dimension a complement and a subject might be mapped onto, all of the functions like $f_{spatial}$, $f_{temporal}$, $f_{informational}$ etc. must be exhaustively retrieved at the verb. The second source of processing costs is hypothesized to be ambiguity resolution at the complement. Exhaustive activation of all dimensions at the verb sets up an ambiguity that has to be resolved at the complement, where a specific dimension has to be selected, with the help of context. The processing costs of ambiguity resolution may be delayed to a post-complement area, given that previous studies of complement coercion have reported spill-over effects at words after the complement (Traxler et al., 2002; 2005).

The SIH finds support in an ERP study on verb class (DiNardo, 2015). Sentences with aspectual verbs such as *The celebrated florist finished the last row of the flower exhibition* were compared with sentences with psych verbs such as *The celebrated florist enjoyed the last row of the flower exhibition*. In the comparison at the verb (*finished* vs. *enjoyed*), a significantly larger negative waveform was evoked at 400 ms after the verb onset in the aspectual verb condition. Moreover, in the comparison at the complement (*row*), a significantly larger positive waveform was found at around 500ms in the aspectual verb conditions. The results of this ERP study supported the two sources of processing costs at verb and complement that were proposed by the SIH.

Further evidence was found in a self-paced reading study and an fMRI study conducted by Lai et al. (2017). Three types of verbs were used including aspectual verbs, as in (2.14a), the *enjoy*-type psych verbs, as in (2.14b) and the *love*-type psych verbs, as in (2.14c). In the self-paced reading experiment, they investigated the verb region (*started/enjoyed/loved*), the complement region (*this CD*), and two words following the complement separately (*of, American*).

(2.14) a. Lady Gaga started this CD of American pop hits.

b. Lady Gaga enjoyed this CD of American pop hits.

c. Lady Gaga loved this CD of American pop hits.

(Lai et al., 2017)

Results of the self-paced reading experiment indicated that there was a marginally significant effect at the verb such that the reading time of the verb in the aspectual verb condition/ *enjoy*-type verb condition was marginally longer than that in the *love*-type verb condition (p = .065). At the two words following the complement, significantly longer reading times were found in the aspectual verb condition compared with the two psych verb conditions while no difference was found between the two psych verb conditions (Lai et al., 2017, p.206).

In the fMRI experiment, Lai et al. (2017) investigated two events, as in (2.15).

(2.15) Event segmentation in Lai et al. (2017, p.209):

Aspectual Verb: (Event 1: subject + verb) *Lady Gaga started* (Event 2: complement – sentence-final) *this CD of American pop hits.*

Enjoy-type Verb: (Event 1: subject + verb) *Lady Gaga enjoyed* (Event 2: complement – sentence-final) *this CD of American pop hits.*

Love-type Verb: (Event 1: subject + verb) *Lady Gaga loved* (Event 2: complement – sentence-final) *this CD of American pop hits.*

Processing costs were found at Event 1 in the aspectual verb condition compared with the *enjoy*-type verb condition and at Event 2 in the aspectual verb condition compared with the *love*-type verb condition which, it was claimed by Lai et al. (2017), supported the SIH.

Processing costs of aspectual verb expressions were also found in a recent study (Lai, Braze, & Piñango, 2023). Eye movements of sentences containing aspectual verbs (2.16a) were compared with those of sentences containing psych verbs (2.16b).

(2.16) a. aspectual verb: Dave Brubeck started this CD of classic Jazz hits.

b. psych verb: Dave Brubeck loved this CD of classic Jazz hits.

(Lai, Braze, & Piñango, 2023)

They investigated ROIs including Region 2 (*started/loved this*), Region 3 (*CD of*), and Region 4 (*classic Jazz*). They reported that processing costs were found in the aspectual verb condition compared with the psych verb condition in relatively late measurements. Longer regression path durations were found in the aspectual verb condition at Region 2 and Region 4. In addition, more first-pass regressions and regression-ins were found in Region 2 and Region 3. The results indicated that participants had difficulty in processing sentences with aspectual verbs compared with sentences with psych verbs, thus making more regressions.

Although the empirical findings reported in previous studies (Katsika et al., 2012; Lai et al., 2017; Lai, Braze, & Piñango, 2023) challenged the type-shifting account, a puzzle for the SIH emerged regarding the prediction of effects at the aspectual verbs in SIH emerged.

In Katsika et al.'s (2012) eye-tracking experiment, a late effect for second-pass time was found in the ROI containing an aspectual verb and a noun (note that they cut the two-word NP complement into halves which were distributed into two ROIs); in Lai et al.'s (2017) fMRI experiment, an effect was found in the ROI containing a subject and an aspectual verb; and in Lai, Braze, & Piñango (2023), relatively late effects were found in the ROI containing an aspectual verb and a determiner. However, when they exclusively looked at the aspectual verb, as Lai et al. (2017) did in the self-paced reading experiment, no significant effects were found at

the verb itself. According to the SIH, the two processes — exhaustive activation at the verb, and ambiguity resolution after the complement has been processed — were thought to be the two sources of costs in processing experiments, though interestingly, Lai et al. (2017) did not predict (or find) any processing effects until the complement had been encountered.

So, as in Lai, Braze, & Piñango (2023), they did not explicitly argue for a processing effect at the verb itself, independent of the costs associated with processing the complement. However, it is not entirely clear why mixed effects at the aspectual verb were found in the literature, or why there should be no early effects for exhaustive retrieval of functions at the verb, which leads to one major motivation for this dissertation.

2.6 Semantic Complexity and Processing Effects at the Verb

The SIH claims that any time an aspectual verb is encountered, all dimension functions are exhaustively accessed. So, the claim is that aspectual verbs are semantically complex. And a number of studies have reported processing costs for semantically complex verbs compared to controls.

Shapiro, Zurif, & Grimshaw (1989), for example, found that the number of argument structure possibilities afforded by the verb had an effect on processing. They used a cross-modal lexical decision task, in which participants heard sentences that they attended to for meaning; crucially, the point where they had to make a lexical decision on a visually presented word was immediately after the verb, that is, before the listener was aware of what arguments were to follow. Verbs with more argument structure possibilities, like *send*, as in (2.17b), (2.17c), and (2.17d) elicited longer decision times than verbs with fewer argument structure possibilities, like *fix*, as in (2.17a). Shapiro et al. argued that all potential argument structures of a verb are exhaustively retrieved and activated (p. 244).

(2.17) Possible argument structures of *fix* and *send*

a. Joe [$_{VP}$ fixed [$_{NP}$ the bicycle]].

b. Sheldon [$_{VP}$ sent [$_{NP}$ the message]].

c. Sheldon [$_{VP}$ sent [$_{NP}$ the message] [$_{PP}$ to Michael]].

d. Sheldon [$_{VP}$ sent [$_{NP}$ Michael] [$_{NP}$ the message]].

(Shapiro, Zurif, & Grimshaw, 1989, p.225)

Similarly, Gennari & Poeppel (2003) argued that if the semantic properties of verbs were immediately accessed when verbs were activated, then more causally complex eventive verbs should be processed more slowly than stative verbs that did not have any causal entailments. They conducted a self-paced reading experiment by comparing sentences containing eventive verbs such as *built* in (2.18a) which entailed causal changes from an initial state to a result state, with sentences containing stative verbs such as *loved* in (2.18b) which involved no causal entailments.

(2.18) a. The retired musician built his second house from scratch.

b. The retired musician loved his second house very much.

(Gennari & Poeppel, 2003, p.B30)

They found that eventive verbs were read significantly more slowly than stative verbs. That is, the effect was found at the verb.

Another example of semantic complexity effects attributable to the verb was seen in the self-paced reading study reported by Brennan & Pylkkänen (2010). They looked at psych verbs of two kinds, subject-experiencer psych verbs and object-experiencer psych verbs. One comparison involved subject-experiencer psych verbs (e.g., *love*, in which the subject experiences the mental state) paired with either neutral or telic modifiers. In what they called the

"simple condition" as in (2.19a), the subject-experiencer verb was paired with a neutral modifier such as *without a doubt*, yielding sentences with "a minimum of lexical semantic complexity" (Brennan & Pylkkänen, 2010, p. 786). In the more complex coercion condition, as in (2.19b), the verb was paired with a telic modifier such as *within a few minutes* which located the endpoint of a period of time. This modifier entailed a change-of-state. The 'simple' stative subject-experiencer psych verb condition was also compared with object-experiencer psych verbs (e.g., *annoy*, in which the object experiences the mental state). Object-experiencer psych verbs were more complex insofar as they entailed not just the presence of a state, but also causation of the mental state.

(2.19) a. Without a doubt, the child cherished the precious kitten.

b. Within a few minutes, the child cherished the precious kitten.

c. Without a doubt, the child scared the precious kitten.

(Brennan & Pylkkänen, 2010, p.786)

The self-paced reading experiment revealed reading slowdowns for both the coercion condition (2.19b) and the semantic complexity condition (2.19c) compared to the simple stative condition (2.19a). The effect was seen at the word immediately following the verb (which was always *the*), but the costs occurred *before* the complement was encountered.

The studies just discussed (Shapiro et al., 1987; Gennari & Poeppel, 2003; Brennan & Pylkkänen, 2010) all found an effect for semantically complex verbs compared to controls either at the verb or immediately afterwards (and, crucially, before the complement had been encountered). In the light of these studies, it seems reasonable to expect an online effect at the semantically complex aspectual verb posited by the SIH.

This expectation is further strengthened by a consideration that the comparison set in several SIH experiments has been psych verbs of the sort considered semantically simple in the studies just referenced, especially the Brennan and Pylkkänen study. That is, all of the psych verbs used in Katsika et al. (2012), Lai et al. (2017), and Lai, Braze, & Piñango (2023) were of the subject-experiencer type and they were not preceded by telic modifiers.

2.7 Context Effects in the Processing of Aspectual Verb Expressions in English

Context effects in the processing of expressions like *began the book* were first investigated in Traxler et al. (2005). In their eye-tracking study, they found that processing costs of *began/enjoyed the book* were not attenuated in the context explicitly mentioning an appropriate activity relevant to the verb phrase. For example, in (2.20a), the context sentence explicitly introduced a *building* event, which was an appropriate event in the interpretation of *began a condominium*, i.e., *began building a condominium*; while in (2.20b), a neutral context was given (Traxler et al., 2005, p. 6).

(2.20) a. context: The contractor had been *building* in the suburbs.

target: That spring, he *began a condominium* next to the shopping center.

b. context: The contractor had been looking for new jobs.

target: That spring, he *began a condominium* next to the shopping center.

(Traxler et al., 2005)

Comparing the eye movements in (2.20a) and (2.20b), no significant difference between the two conditions was found in the target sentences. However, in the other two experiments, Traxler et al. (2005) created contexts with the *event sense* by either providing the identical VPs as were used in the target sentences, as in (2.21a), or by explicitly mentioning the event structure, as in (2.21b). In (2.21c) and (2.21d), neutral verbs like *read* were used as the controls.

(2.21) a. context: The student *started a book* in his dorm room.

target: Before he *started the book* about the opium trade, he checked his e-mail.

b. context The student *read a book* in his dorm room.

target: Before he *started the book* about the opium trade, he checked his e-mail.

c. context The student *started a book* in his dorm room.

target: Before he *read the book* about the opium trade, he checked his e-mail.

b. context The student *read a book* in his dorm room.

target: Before he *read the book* about the opium trade, he checked his e-mail.

(Traxler et al., 2005)

No significant difference across conditions was found in the target sentences, which indicated that the processing of the aspectual verb expressions in the target sentences (2.21a) and (2.21b) was facilitated by the contexts. Although Traxler et al. (2005) conflated aspectual verbs with psych verbs and other verbs, results partially suggested an immediate context effect in the processing of aspectual verb expressions, which was consistent with the SIH.

The SIH claims that the interpretation of aspectual verb expressions is decided by the dimension (e.g. eventive, informational, spatial, etc.) that the structured individual is mapped onto, which is determined by the context.

Again, taking *John finished the book* as an example, when the structured individual is mapped onto the *eventive* dimension, an agentive reading like *John finished reading/writing the book* is available. When it is mapped onto the *informational* dimension, a constitutive reading like *John was the last character in the book* is available. The SIH predicts that the availability of these readings is determined by context.

So, to examine the prediction, Lai and Piñango (2019) investigated sentences with aspectual verbs in an offline sentence interpretation task using questionnaires, and successfully observed the expected context effects. Lai and Piñango (2019) created three types of contexts, namely, the neutral context (2.22a) in which both the agentive reading and the constitutive reading should be accessible, the agent-biasing context (2.22b) in which the agentive reading should be easier to access, and the constitutive-biasing context (2.22c) in which the constitutive reading should be easier to access.

(2.22) a. neutral context:

Most actors keep video clips that feature themselves as well as other well-known performers.

b. agent-biasing context:

Well-known actresses often watch popular sitcoms in their free time.

c. constitutive-biasing context:

Television sitcoms often produce specials that feature individual characters.

target: Jennifer Aniston finishes this DVD of "Friends" season 1 bloopers.

(Lai and Piñango, 2019)

Participants were asked to choose a reading, either an agentive reading or a constitutive reading, after reading through each sentence. Results showed that in the neutral context, there was no difference in the choice of the two readings; in the agent-biasing context, participants chose the agentive reading more often; while in the constitutive-biasing context, participants chose the constitutive reading more often. So, Lai and Piñango (2019) found that context did affect the interpretation of sentences with aspectual verbs.

However, when it came to online processing, context effects were not observed. Lai, Braze, & Piñango (2023) conducted an eye-tracking study using three types of contexts, as in

(2.23). The ROIs in this study included Region 2 (*started/loved this*), Region 3 (*CD of*), and Region 4 (*classic Jazz*). But no significant difference across conditions was found at any region for any eye-movement measure in the target sentences, which suggested that there were no online context effects in the processing of sentences with aspectual verbs in English.

(2.23)

a. neutral context: Musicians often record their pieces for compilation or memorial albums.

target: Dave Brubeck started this CD of classic Jazz hits.

b. agent-biasing context: Many musicians have music libraries that contain tons of albums.

target: Dave Brubeck started this CD of classic Jazz hits.

c. constitutive-biasing context: Kevin owns numerous CDs by different Jazz musicians.

target: Dave Brubeck starts this CD of classic Jazz hits.

(Lai, Braze, & Piñango, 2023)

The null result found in Lai, Braze, & Piñango (2023) is surprising because it is inconsistent with the finding of Lai and Piñango (2019) in which participants arrived at the reading(s) biased by context in the offline questionnaire study. Thus, Lai, Braze, & Piñango (2023) claimed that the conflicting results of the two studies suggested that the effect of context is largely delayed and is only observable when the processor is forced to make a choice.

They further argued that in the processing of aspectual verbs, context *privileges* rather than *pre-determines* the interpretation. If the context *pre-determines* the interpretation, only the appropriate dimension is retrieved while all the other dimensions are suppressed, whereas, if the context *privileges* the interpretation, the appropriate dimension is privileged, and all other

dimensions are retrieved anyway. So, Lai, Braze, & Piñango (2023) argued that their online results suggested that the context *privileges* the interpretation of aspectual verb expressions. But on the other hand, Lai, Braze, & Piñango (2023) claimed that the time-course of context effects may be affected by the strength of the contextual cue. Therefore, it is not clear whether the conflicting results found in the offline questionnaire study versus the online eye-tracking study were due to the privileging process or lack of strength of the context, which leads to another major motivation of this dissertation.

2.8 Conclusion

In this chapter, I discussed the available accounts of verb expressions like *begin/enjoy the book*, including the type-shifting account, the unification account, and the surprisal account. These accounts were later challenged by studies in which processing costs were only found in aspectual-verb expressions (*begin*, *finish*, *complete*, *etc.*) compared with psych-verb expressions (*enjoy*, *love*, *endure*, etc.) and other verb expressions (*attempt*, *manage*, *etc.*) when different classes of verbs were investigated separately. This empirical finding led to another account, the *Structured Individual Hypothesis* (SIH), which modeled the processing of aspectual-verb expressions in two phases, one being the exhaustive retrieval of all lexically encoded dimensions at the aspectual verb, and the other one being the ambiguity resolution at the complement. In addition, the SIH predicted that the interpretation of aspectual-verb expressions was determined by context. With this as a background, we can now turn to examining the SIH and the time-course of context effects in the following chapters.

CHAPTER 3. ASPECTUAL VERBS AND PSYCHOLOGICAL VERBS FORM TWO DIFFERENT VERB CLASSES IN MANDARIN

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In this chapter, I will report an eye-tracking study on the real-time processing of aspectual verbs and psych verbs in Mandarin and discuss what implications for the processing of sematic complexity I gain from the findings of this study.

3.1 Introduction

The studies discussed in Chapter 2 have been carried out in English and, other than one lab (Katiska et al, 2012, and Lai et al. 2017), no-one has investigated aspectual verbs and psychological verbs separately. Katsika et al. (2012) reported a surprising finding that challenged all accounts that conflated aspectual and psych verbs. They found that sentences involving the

aspectual verbs were more costly than those involving psych verbs. This is a major finding because of its potential theoretical implications and, as such, it merits further investigation, which is one motivation for the current study.

The studies on semantic complexity reviewed in Chapter 2 (Shapiro et al., 1987; Gennari & Poeppel, 2003; Brennan & Pylkkänen, 2010) all found the semantic complexity effect either at the verb or immediately afterwards (and before the complement), thus it is reasonable to expect real-time effects at the semantically complex aspectual verb posited by the SIH. Moreover, all of the psych verbs used in Katsika et al. (2012), Lai et al. (2017), and Lai, Braze, & Piñango (2023) are subject-experiencer psych verbs without being preceded by telic modifiers, which considered semantically simple in the studies just referenced.

The three SIH online studies that have compared sentences with aspectual verbs to sentences with psych verbs have yielded mixed findings at the verb. Katsika et al.(2012), in an eye-tracking study, found an late effect at second-pass time at the verb, when it is arguable that participants were returning to the verb after reading the complement. In a self-paced reading study, Lai et al. (2017) observed slower reading times that approached significance ($p = 0.06$) for aspectual verbs compared to some psych verbs. Lai, Braze, & Piñango (2023) found slower reading times for aspectual verb sentences compared to psych verb sentences. Interestingly, they found an effect in the verb region for regression path duration. This measure sums all fixations from the first entry in a region but ends with the first forward saccade past the right boundary of the region (Rayner, 1998, p. 377; Clifton, Staub, & Rayner, 2007, p. 348). Thus, the complement has not yet been encountered.

I am left with a mixed set of results between the three SIH studies, from no effect at the verb to a rather clear effect at the verb. Because one study does show clear costs for processing

aspectual verbs at the verb, and because a range of studies have shown costs at the verb for other kinds of lexical semantic complexity, I predict an effect in an early stage i.e., at the verb. So, a second motivation for the present study is to investigate semantic complexity effects at the verb.

3.2 Motivation of the investigations in Mandarin

The present study was conducted in Mandarin. Mandarin is a potentially informative choice of language for several reasons. First, it exhibits the phenomenon of allowing entity-denoting complements which can be paraphrased as event-denoting complements. This is confirmed in both corpus studies and theoretical discussions (Liu, 2005; Lin, Hsieh, & Huang, 2009; Hsu and Hsieh, 2013; Song, 2011; 2014).

Second, not all of the verbs that exhibit the phenomenon in English do so in Mandarin. For example, while *continue* and *finish* seem to behave the same way in Mandarin as they do in English, *begin* does not always allow entity-complements in Mandarin (Lin & Liu, 2005). So, if we use the same simple declarative transitive sentences as have been used in English, a slightly different set of aspectual verbs must be used. Then, if the Mandarin findings match those in English, it will suggest that the English findings are robust enough to hold up in a modified choice of aspectual verbs.

In this study, five aspectual verbs and five psychological verbs, listed in (3.1) were selected as the matrix verbs for the two experimental conditions — the aspectual verb condition and the psych verb condition:

(3.1)

Aspectual verbs: *jieshu (finish), wancheng (finish), jixu (continue), gan (rush), tuichi (postpone)*

Psychological verbs: *xiangshou (enjoy), xihuan (enjoy), kangju (resist), dichu (resist)*, *changshi (try)*

There are two verbs for 'finish'. The verb, *changshi (try)* is listed as a psych verb because it requires an experiencer as a subject, and refers to the mental state of sampling an experience.

A third reason that Mandarin is a useful language for this study is that we can test directly a key claim of the SIH. At issue is what counts as an aspectual verb. One criterion is practical: they are verbs that have been used in multiple studies and which have been found to bear a cost (along with psych verbs and others) compared to controls. A second criterion, one that is central to the SIH, appears to be that these verbs allow not only Agentive readings but also a range of Constitutive readings, which is why they are thought to be costly to process.

But what counts as an aspectual verb need not be limited by these criteria. A looser criterion for inclusion could be that the verb expresses how an action, event, or state extends over time. In view of this, we included in the aspectual verb condition two verbs that have not been tested in English, the Mandarin equivalents of *rush (gan)* and *postpone (tuichi)*. Both of these verbs can be followed by an entity-denoting complement (Liu, 2005; Lin et al., 2009; Hsu and Hsieh, 2013), as in (3.2).

(3.2) gan gongjiao

rush bus

"rush to take the bus"

One reason to include them was that either they pick out the run-time of an event (like *continue*, which is routinely used in English studies), or they shift the whole event time. The major reason to include them, however, is that they do not allow Constitutive readings. In this respect, they contrast with the other aspectual verbs we used. This makes it possible to directly

compare two types of aspectual verbs, those that allow Constitutive readings, and those that do not. So, that is a third motivation for the present study.

If it turns out that *rush (gan)* and *postpone (tuichi)* pattern together with the other aspectual verbs (which do allow the full range of readings) in being costly to process relative to psych verbs, then it cannot be due to the availability of Constitutive readings. Conversely, if there is no effect for 'rush' and 'postpone', but there is an effect for the other aspectual verbs, then this would provide support for the SIH claim that the availability of constitutive readings (along with the agentive reading) is a property of aspectual verbs.

3.3 Method

3.3.1 Participants

A total of 102 people participated in the pre-tests and 37 people participated in the eye-tracking experiment. All the participants recruited for this study were right-handed and native Mandarin Speakers. They lived or had lived in the US for not more than five years. In the pre-tests, participants were either students and visiting scholars on campus at Michigan State University or scholars who had visited Michigan State University before but already left the campus. In the eye-tracking experiment, all participants (20 female, 17 male, age range 21-41 years) were students, post-docs or visiting scholars on campus in Michigan State University. All reported normal or corrected to normal vision without neurological or cognitive disorders. In both pre-tests and the eye-tracking experiment, participants gave their informed consent beforehand and were paid for their participation.

3.3.2 Materials

38 sentence quadruples were created. Sample stimuli are shown in Table 3.1. All the sentences were distributed to four different lists such that each participant only read one sentence

in each quadruplet. The ratio of experimental and filler sentences was 1:2. Each list contained 124 sentences, comprising 38 experimental sentences, and 76 fillers, half of which were plausible and the other half implausible. Comprehension questions were Yes/No questions, appearing randomly once every three sentences.

Table 3.1 Sample Stimuli in Mandarin

Aspectual	Qingnian zuojia Zhanglan jieshu zhe ben sanwenheji ling duzhe powei chayi young writer Zhanglan finish this CLASSIFIER book of essays make reader very surprised *"The young writer Zhanglan finishes a book of essays which makes readers very surprised."*
Aspectual control	Qingnian zuojia Zhanglan zhuanxie zhe ben sanwenheji ling duzhe powei chayi young writer Zhanglan write this CLASSIFIER book of essays make reader very surprised *"The young writer Zhanglan writes a book of essays which makes readers very surprised."*
Psych	Qingnian zuojia Zhanglan xihuan zhe ben sanwenheji ling duzhe powei chayi young writer Zhanglan enjoy this CLASSIFIER book of essays make reader very surprised *"The young writer Zhanglan enjoys a book of essays which makes readers very surprised."*
Psych control	Qingnian zuojia Zhanglan yuedu zhe ben sanwenheji ling duzhe powei chayi young writer Zhanglan read this CLASSIFIER book of essays make reader very surprised *"The young writer Zhanglan reads a book of essays which makes readers very surprised."*

3.3.3 Pre-tests

Five pre-tests were carried out to collect matrix verbs for the control conditions, and also to control for the any possible unintended influences of verb frequency, word length, plausibility, or the predictability of the upcoming NP complement. All pre-test data were analyzed in R (Version 3.6.1; R Core Team, 2017)).

3.3.3.1 Fill-in-the-blank test

A fill-in-the-blank test aimed at collecting matrix verbs for the control conditions. 20 participants were recruited to take part in an online survey. 72 pairs of candidate sentences were created prior to the pre-test, comprising 72 aspectual sentences and 72 psych sentences, randomized and divided into two lists, each assigned to 10 participants. Participants were asked to fill in the blank with an appropriate verb in sentences such as: *The famous musicians finish _____ a pop record but the public have mixed opinions*. Following the procedures used in previous studies (e.g., McElree et al. 2001; Baggio et al. 2010), synonyms and near-synonyms among the responses were first conflated. 70 pairs of sentences were then selected because the dominant response occurred more than twice as often as the next most frequent response. The selected verbs occurred 8.2 times (out of 10) on average in the aspectual condition and 8.3 times on average in the psych condition. Using the verbs collected in the fill-in-the-blank test, 70 control sentences for the aspectual condition and 70 control sentences for the psych condition were created.

Note that separate controls were established for aspectual verbs and for psych verbs. This was done to make sure that controls were sensitive to each condition, which was especially important given the comparisons the present study targets. In fact, about 30% of the control verbs chosen by participants differed between conditions.

3.3.3.2 Word length test

To control for potential effects of different word length across conditions, the word length of the matrix verbs in all the four conditions was compared using ANOVA. The mean word length between all conditions was not significantly different ($F_{(3, 152)} = 2.25$, $p = 0.09$; the mean length in characters was 1.7 (aspectual), 1.7 (aspectual control), 2.0 (psych), and 1.8 (psych control), respectively).

3.3.3.3 Verb frequency test

Matrix verb frequencies were collected from the BLCU (Beijing Language and Culture University) Corpus Center, which contains 15 billion Chinese characters. The mean verb frequencies were 337326 (aspectual), 190391 (aspectual control), 312772 (psych), 208185 (psych control). Since the verb frequency data were not normally distributed, a logarithmic transformation (X'=log(X)) was performed on the data. A one-way ANOVA revealed no significant difference across conditions ($F_{(3, 276)} = 1.31$, $p = 0.12$).

3.3.3.4 Plausibility judgement test

A plausibility judgement test was carried out in order to control for possible differences in sentence plausibility across conditions. 42 participants were assigned to one of four different lists. Each participant was required to rate sentences on a Likert Scale from 1 (make no sense) to 5 (make perfect sense). There was a significant difference between conditions in the plausibility ratings ($F_{(1 , 257)} = 44.2$ $p < 0.001$). As a result, quadruples with low plausibility were deleted and 38 quadruples of sentences were retained. Comparing the plausibility ratings between the four conditions in the 38 quadruples, the means were 4.0 (aspectual), 3.9 (aspectual control), 4.0 (psych), 3.9 (psych control). A repeated measures ANOVA with condition as within-items ($F_{(3,}$

$_{105)} = 1.25$, $p = 0.30$) and within-subjects ($F_{(3, 123)} = 1.07$, $p = 0.37$) factors did not show any significant difference.

3.3.3.5 Cloze probability test

To control for the potential influence of different predictability of the NP complement across conditions, a cloze probability test was carried out. The stimuli were divided into four lists and 40 different participants were recruited; they were asked to fill in the blank with a classifier and an NP in sentence frames such as this: *The famous musicians finished a ____(classifier) ____ (NP)*. The reason why the classifier was asked for is that, in Mandarin, NPs require particular classifiers and so the presence of a classifier would provide a clue as to what the upcoming word might be. The mean cloze probabilities were 0.6 (aspectual), 0.5 (aspectual control), 0.6 (psych), 0.5 (psych control). There was no significant difference across conditions, based on the one-way ANOVA analysis ($F_{(3 , 148)} = 0.42$, $p = 0.74$).

3.3.4 Procedure

Eye movements were recorded by an EyeLink 1000 desk-mounted eye-tracking camera sampling at 1000 Hz (SR Research Ltd.; http://www.sr-research.com/). The right eye of each participant was recorded. The camera was set at 60 cm from participants and their eyes were aligned with the top 25% of the screen of the display computer. Texts of stimuli were presented in black on a white background in a single line. The font of texts was SimSun for Chinese characters and the font size was 18. The experiment started with a 9-point calibration. Calibration was checked after each trial. Recalibration was carried out at any time if the eye-tracker failed to record eye movements.

Four counterbalanced lists of stimuli were created and each participant was assigned to one list such that each participant saw only one item from each quadruple in a Latin square

design. The experiment started with 10 practice trials. Experimental trials including 38 experimental stimuli, 38 plausible fillers and 38 implausible fillers were randomized and divided into three blocks so that participants could take a break between blocks. The eye-tracking camera was recalibrated after each break to ensure good quality of data.

Every sentence started with a fixation cross. When gaze at the fixation cross was captured by the eye-tracker, the sentence would appear on the screen automatically. Participants were instructed to press the *spacebar* to bring up the next sentence. When a sentence was followed by a comprehension question, participants were instructed answer by pressing either *A (YES)* or *L (NO)*. Keyboard responses were recorded. The response accuracy in the present study was 96.5%.

The eye-tracking data of each individual participant was inspected trial by trial. This inspection did not necessitate the removal of any participant from the data analysis. Vertical drift occurred in the data of 4 participants (out of 37), so trials with drift were semi-automatically corrected in Data Viewer (v.3.2.1) following the procedures in Godfroid (2020) for data cleaning.

3.4 Data Analysis

Four regions of interest were defined (Table 3.2) and the number of characters within each region (except for the verb region) was kept constant across all conditions. Region 1 was the pre-verb region; region 2 was the matrix verb region; region 3 was the NP complement consisting of six characters; region 4 was the post-NP region, consisting of four characters following the complement to check for spill-over effects (Traxler et al., 2002). Words at the end of sentences were not included in Region 4 in order to preclude possible sentence wrap-up effects.

Table 3.2 Regions of Interest

	Region 1	**Region 2**	**Region 3**	**Region 4**	
Aspectual	Qingnian zuojia Zhanglan young writer Zhanglan	jieshu finish	zhe ben sanwenheji this-CL book of essays	ling duzhe po make reader very	wei chayi. surprised
Aspectual control	Qingnian zuojia Zhanglan young writer Zhanglan	zhuanxie write	zhe ben sanwenheji this-CL book of essays	ling duzhe po make reader very	wei chayi. surprised
Psych	Qingnian zuojia Zhanglan young writer Zhanglan	xihuan enjoy	zhe ben sanwenheji this-CL book of essays	ling duzhe po make reader very	wei chayi. surprised
Psych control	Qingnian zuojia Zhanglan young writer Zhanglan	yuedu read	zhe ben sanwenheji this-CL book of essays	ling duzhe po make reader very	wei chayi. surprised

Five measures of eye-movement data were analyzed, including first-pass reading time, first-pass regression, regression path duration, total time, and second-pass time. First-pass reading time refers to the sum of all fixations from the gaze first entering the region of interest till it leaves this region. First-pass regression refers to whether or not the gaze goes back to a previous region before it moves to the next region of interest. Regression path duration refers to the sum of fixation times in a region of interest, including fixations after going back to the previous regions. Total time refers to the sum of all fixation times in a region of interest (Clifton, Staub, & Rayner, 2007). Second-pass time refers to all fixations made in the region of interest when the eyes visit the area for the second time (Godfroid, 2020).

For first-pass reading time, regression path duration, and total time, a logarithmic transformation ($X' = \log(X+1)$) was applied due to the non-normal distribution (examined by Shapiro-Wilk test with $p < 0.001$). Linear Mixed Effects Models were used to analyze these data by region in R (Version 3.6.1), with the lmer() function in the *lme4* package (Version 1.1.21).

Since first-pass regression data were binary, Logistic Mixed Effects Models were conducted with the glmer() function in the *lme4* package (Version 1.1.21), fit by maximum likelihood estimation.

Given the complex random effect structure, model selection was performed among a series of models decreasing the complexity of random effects, step by step, so as to determine the best-fitting model for each eye movement measure in each region of interest (Baayen, Davidson, & Bates, 2007). The goodness-of-fit of the models was compared using the Akaike Information Criterion (AIC) and likelihood ratio test. The selected model was then used for both Linear Mixed Effects Models and Logistic Mixed Effects Models analyses.

For the measures analyzed in Linear Mixed Effects Models, a Type III analysis of variance was carried out for the fixed term, 'Condition', using Satterthwaite's method. If there was a significant difference between conditions, three independent contrasts of 'Aspectual *vs.* Aspectual control', 'Psych *vs.* Psych control', and 'Aspectual *vs.* Psych' were conducted with adjustment using the Bonferroni method at *alpha* = 0.05. For Logistic Mixed Effects Models of first path regression percentage**,** to determine if Condition has a significant effect on the model, likelihood ratio tests were used to compare models with and without the fixed term at *alpha* = 0.05.

Four models were constructed in the stage of model selection. At the verb region, the likelihood ratio tests showed no significant difference between the four models for all measures. However, AIC and the likelihood ratio tests in other regions of interest showed that the model with subjects and items as random intercepts was significantly different from the models with higher complexity. In addition, the majority of the AIC values of Model 3 were the lowest. Taking the model selection results of total time in the NP region as an example (Table 3.3), model 3 was shown to be the best fitting model ($p < 0.05$). So, we decided to use a model with condition as fixed effects, by-subject and by-item intercepts as random effects.

Table 3.3 Model selection results suggested that Model 3 with by-subject and by-item random intercepts was the best-fitting model. An example of model selection results in NP region for total time is presented here

Model	Outcome variable	Fixed effect	Random effects										
	Total Time	Condition	By-subject random intercept	By-item random intercept	By-list random intercept	By-subject random slope for condition	By-subject random intercept-slope correlation for condition	d.f.	AIC	logLik	χ^2	d.f.	*p*
Model 1	X	X	X	X	X	X	X	18	-226.21	131.11	6.67	10	0.76
Model 2	X	X	X	X	X			8	-239.54	127.77	1.033	1	0.31
Model 3	X	X	X	X				7	-240.51	127.25	66.76	1	< .001
Model 4	X	X	X					6	-175.75	93.88			

3.5 Results

Data were firstly analyzed for all verbs in all four conditions by region of interest. Given that *gan (rush) and tuichi (postpone)* have only an Agentive reading while *wancheng (finish), jieshu (finish) and jixu (continue)* have both Agentive and Constitutive readings, data for these two aspectual verb types compared to control and psych conditions were then analyzed separately.

3.5.1 Results for all verbs

Region 1: Pre-verb

In the pre-verb region, as expected, there were no effects in first-pass time, regression path duration, total time, and second-pass time (see Table 3.4 and Table 3.5). No first-pass regressions were detected.

Region 2: Matrix verb

Main effects of condition were detected in first-pass time ($F_{(3, 1038)} = 3.11$, $p = 0.026$) and total time ($F_{(3, 1038)} = 2.95$, $p = 0.032$).

Independent contrasts, adjusted by the Bonferroni method, revealed that first-pass time for the aspectual condition was significantly longer than for the psych condition ($t_{(1037)} = 2.52$, $p = 0.036$).

In addition, first-pass time for the aspectual condition was significantly longer than for its control condition ($t_{(1046)} = 2.50$, $p = 0.038$). Pairwise comparisons showed that total time for the aspectual condition was also significantly longer than for its control condition ($t_{(1045)} = 2.71$, $p < 0.020$).

Region 3: NP Complement

Main effects of verb type were found in regression path duration ($F_{(3, 1252)} = 3.68$, $p = 0.012$] and total time ($F_{(3, 1253)} = 7.39$, $p < 0.001$).

Pairwise comparisons indicated that the regression path duration for the aspectual condition was longer than for its control condition ($t_{(1253)} = 2.51$, $p = 0.036$). The total time for the aspectual condition was also longer than for its control ($t_{(1253)} = 3.48$, $p = 0.0016$).

Region 4: Post-NP

A main effect of verb type was found in regression-path duration ($F_{(3, 1283)} = 2.92$, $p = 0.033$) and second-pass time ($F_{(3, 1284)} = 2.74$, $p = 0.042$). Pairwise comparisons revealed that regression path duration for the aspectual condition was longer than for its control ($t_{(1284)} = 2.91$, $p = 0.011$). Second-path time for the aspectual condition was longer than for its control ($t_{(1285)} = 2.53$, $p = 0.034$).

Table 3.4 Fixation Times by Verb Type in each ROI (all verbs). Means & SDs

Region / Condition	First-pass Time (ms)	First-pass Regression (%)	Regression Path Duration (ms)	Total Time (ms)	Second-pass Time (ms)
Region 1: Pre-verb					
Aspectual	566 (250)	0	566 (250)	825 (463)	181 (214)
Aspectual control	555 (246)	0	555 (246)	807 (449)	185 (225)
Psych	565 (262)	0	565 (262)	856 (513)	208 (253)
Psych control	546 (248)	0	546 (248)	804 (468)	196 (242)
Region 2: Verb					
Aspectual	264 (125) *	8	316 (237)	418 (281) *	113 (150)
Aspectual control	241 (111) *	9	290 (194)	354 (245)	84 (136)
Psych	240 (110)	9	296 (217)	377 (252)	97 (135)
Psych control	253 (119)	7	298 (205)	360 (254)	76 (125)

Table 3.4 (cont'd)

Region 3: NP Complement					
Aspectual	498 (251)	17	676 (449)] *	907 (556)] **	254 (318)
Aspectual control	500 (274)	11	638 (502)	839 (593)	234 (362)
Psych	506 (260)	13	652 (443)	871 (588)	229 (311)
Psych control	482 (260)	13	605 (445)	782 (509)	186 (254)
Region 4: Post-NP					
Aspectual	427 (223)	37	665 (420)] *	878 (1024)	166 (254)] *
Aspectual control	414 (216)	38	578 (371)	759 (826)	118 (218)
Psych	436 (240)	37	637 (423)	804 (828)	140 (218)
Psych control	445 (237)	36	635 (445)	861 (916)	138 (276)

(* $p < .05$, ** $p < .01$)

Table 3.5 Summary of test statistics of Linear Mixed Effects Models with Satterthwaite approximations (F value, degree of freedom and p-value) and Logistic Mixed Effects Models with likelihood ratio tests (Chi-square value, degree of freedom and p-value)

All verbs

Region / Condition	**First-pass Time**			**First-pass Regression**			**Regression Path Duration**			**Total Time**			**Second-pass Time**		
	F	*d.f.*	*p*	χ^2	*d.f.*	*p*	*F*	*d.f.*	*p*	*F*	*d.f.*	*p*	*F*	*d.f.*	*p*
Region 1: Pre-verb	1.14	1242.2	0.33	-	-	-	1.14	1242.2	0.33	1.47	1240.4	0.22	0.49	1240.3	0.69
Region 2: Verb	3.11	1037.9	0.026	1.23	3	0.75	1.13	1042	0.33	2.95	1037.9	0.032	2.48	1043.2	0.06
Region 3: NP Complement	0.99	1252.6	0.40	6.60	3	0.086	3.68	1252	0.012	7.40	1252.6	<0.001	1.68	1256	0.17
Region 4: Post-NP	0.90	1284	0.44	0.48	3	0.92	2.92	1283.1	0.033	1.71	1283.2	0.16	2.74	1284.3	0.042

Table 3.5 (cont'd)

The 2 'finish' verbs and 'continue'															
	F	*d.f.*	*p*	χ^2	*d.f.*	*p*	*F*	*d.f.*	*p*	*F*	*d.f.*	*p*	*F*	*d.f.*	*p*
Region 1: Pre-verb	0.44	813.7	0.72	-	-	-	0.44	813.7	0.72	0.55	812.6	0.65	0.04	814.3	0.99
Region 2: Verb	3.37	552.4	0.018	0.72	3	0.87	0.66	555.4	0.58	3.00	551.5	0.030	2.09	556.5	0.10
Region 3: NP Complement	0.52	805.5	0.67	7.09	3	0.069	4.20	804.2	0.0058	5.96	804.6	<0.001	1.58	807.6	0.19
Region 4: Post-NP	0.24	824.6	0.87	1.10	3	0.78	0.99	824.2	0.39	1.03	823.9	0.38	2.00	825.2	0.11

Table 3.5 (cont'd)

The 'rush' and 'postpone'															
	F	*d.f.*	*p*	χ^2	*d.f.*	*p*	*F*	*d.f.*	*p*	*F*	*d.f.*	*p*	*F*	*d.f.*	*p*
Region 1: Pre-verb	1.44	396	0.23	-	-	-	1.44	396	0.23	1.83	396.2	0.14	0.62	402.1	0.60
Region 2: Verb	1.17	357	0.32	1.70	3	0.64	0.64	359.6	0.59	0.92	355.8	0.43	1.52	367.6	0.21
Region 3: NP Complement	0.73	406.3	0.54	1.54	3	0.67	0.25	405.7	0.86	1.74	405.9	0.16	1.27	413.2	0.29
Region 4: Post-NP	1.09	434.1	0.35	3.27	3	0.35	2.65	420.1	0.051	2.58	416.7	0.053	0.67	419.5	0.57

' – ' indicates that no first-pass regression were detected.

3.5.2 Results for *finish* and *continue*

The same analysis was also applied with respect to *wancheng* (*finish), jieshu (finish)* and *jixu* (*continue)*. (Eliminating stimulus quadruples for *gan (rush)* and *tuichi (postpone)* meant that 25 of the full set of 38 stimulus-quadruples were at issue.) Results at all regions of interest in all six measures are given below.

Table 3.6 Fixation Times by Verb Type in each ROI (for the 2 'finish' verbs and 'continue'). Means & SDs

Region / Condition	First-pass Time (ms)	First-pass Regression (%)	Regression Path Duration (ms)	Total Time (ms)	Second-pass Time (ms)
Region 1: Pre-verb					
Aspectual	562 (244)	0	562 (244)	814 (438)	183 (216)
Aspectual control	566 (248)	0	566 (248)	793 (404)	173 (208)
Psych	564 (264)	0	564 (264)	839 (522)	199 (256)
Psych control	559 (253)	0	559 (253)	823 (463)	198 (254)
Region 2: Verb					
Aspectual	261 (122) ┐	10	317 (252)	439 (307) ┐ *	121 (153)
Aspectual control	240 (114) ┘ *	12	287 (192)	353 (245) ┘	87 (139)
Psych	235 (110) ┘	12	305 (250)	376 (250)	102 (134)
Psych control	259 (127)	10	307 (236)	374 (263)	82 (123)

Table 3.6 (cont'd)

Region 3: NP Complement					
Aspectual	492 (234)	19	679 (448)] *	896 (583)] **	243 (303)
Aspectual control	482 (260)	11	617 (489)	784 (518)	225 (373)
Psych	473 (239)	15	643 (469)	818 (512)	229 (327)
Psych control	477 (257)	13	596 (422)	768 (526)	182 (262)
Region 4: Post-NP					
Aspectual	419 (217)	39	633 (414)	831 (1002)	150 (241)
Aspectual control	418 (213)	42	546 (302)	737 (657)	92 (165)
Psych	436 (242)	42	611 (378)	798 (697)	128 (201)
Psych control	442 (236)	39	604 (379)	823 (954)	114 (210)

(* $p < .05$, ** $p < .01$)

Region 1: Pre-verb

At the pre-verb region, there were no effects in first-pass time, regression path duration, total time and second-pass time (see Table 3.6 and Table 3.5). No first-pass regression were detected.

Region 2: Matrix verb

Main effects of verb type were found in first-pass time ($F_{(3, 552)} = 3.37$, $p = 0.018$) and total time ($F_{(3, 552)} = 3.0038$, $p = 0.030$). *Post hoc* comparisons revealed that first-pass time for the aspectual condition was significantly longer than for the psych condition ($t_{(551)} = 2.49$, $p = 0.040$). The difference in first-pass time between the aspectual condition and its control was marginally significant ($t_{(556)} = 2.27$, $p = 0.068$). Total time in the aspectual condition was significantly longer than for its control condition ($t_{(554)} = 2.89$, $p = 0.012$).

Region 3: NP-Complement

There were main effects of verb type in regression path duration ($F_{(3, 804)} = 4.20$, $p = 0.0058$) and total time ($F_{(3, 804)} = 5.96$, $p < 0.001$). Pairwise comparisons indicated that regression path duration for the aspectual condition was significantly longer than for its control ($t_{(805)} = 2.85$, $p = 0.014$), and that total time for aspectual condition was longer than for the control ($t_{(805)} = 3.29$, $p = 0.0032$).

Region 4: Post-NP

No main effects of verb type were found on any measure in the post-NP region.

3.5.3 Results for *rush* and *postpone*

The same analysis as was conducted for the overall analysis reported above was applied to data of *gan (rush)* and *tuichi (postpone)*. No main effects of verb type were detected for any measure in any region. (Eliminating the stimulus quadruples for *wancheng* (*finish), jieshu*

(finish), and *jixu* (*continue)* meant that there were 13 of the full set of 38 stimuli-quadruples at issue, so the lack of any significant effects is not surprising).

3.6 Discussion

In this study, we set out to investigate the processing of expressions involving aspectual verbs compared to psych verbs in Mandarin. We sought to determine whether aspectual verb sentences were more costly than psych verbs compared to controls; whether there was any difference between the aspectual and psych verb types at the verb region; and whether any costs were due to the availability of both Agentive and Constitutive readings. We will consider the findings for each goal in turn.

3.6.1 Aspectual and Psych conditions compared to control conditions

Significant processing costs were found when comparing sentences with aspectual verbs with their controls. Effects were found at the verb region in first pass time and in total time, and at the NP-complement region in regression path duration and total time. Also, there was an effect in the post-NP region in regression path duration. By contrast, there were no significant costs for psych verbs compared to their controls.

The pattern of effects in the two comparisons are plainly very different. Expressions with aspectual verbs are costly relative to controls, whereas expressions with psych verbs are not.

The costs for the aspectual verb condition compared to controls at the NP-complement and post-NP regions are likely due to processing ambiguity at the complement. Consistent with this, the effects were observed in regression path duration and total time, when participants' gaze may have returned to the verb region to resolve difficulty that they experienced at the complement. This may also have contributed to the spillover effects found in the post-NP region.

These findings support those of Katsika et al. (2012) and Lai et al. (2017) insofar as they reinforce their discovery that psych verbs and aspectual verbs behave differently at, or immediately after, the complement. These findings also lend support to the distinction between the two verb types because they are shown to incur different processing costs in another language, one that is unrelated to English. That we can confirm this effect, and do so in another language, is important because the difference in verb types had only previously been found by one research group and only in English. The fact that these verb types have distinct processing profiles is something that any theory needs to account for.

Particularly interesting is the effect at the verb. This occurs not only in total time, but in first pass time, and it is the latter that is of particular interest. Because that same early effect occurred in the comparison between the aspectual verb condition and the psych verb condition, they will be discussed together in what follows.

3.6.2 The aspectual condition compared to the psych condition

The significant difference occurs in the verb region, where the aspectual condition was read more slowly than the psych condition. The effect occurs early, during first pass reading, as does the effect between the aspectual condition and its control. First pass time is typically associated with lexical retrieval, and not with some integrative process downstream (Clifton et al., 2007). Recall that the SIH posits exhaustive retrieval of lexical functions as soon as an aspectual verb is encountered. We argued above that this ought to result in a measurable cost relative to a simpler verb type. And the cost that is relevant in eye-tracking is first pass time.

Yet, the proponents of the SIH have shied away from making any claim consistent with costs for lexical retrieval at the verb. They have instead focused on compositionality between the exhaustive retrieval of the verb's lexical functions and the dimension ambiguity at the

complement (e.g., Piñango & Deo, 2016, p. 396; Lai et al, 2017, pp. 217-221). Even where they find an effect at the verb, in regression path duration (Lai, Braze, & Piñango, 2023), they interpret it in terms of the verb's argument structure, but avoid ascribing it to activation of the verb's lexical functions.

If the effect were indeed due to activation of the aspectual verb's lexical functions, this would not present any difficulty for the SIH, so the reticence in this regard has seemed perplexing to us.

One possible concern is that it might have appeared rather complicated to assert a difference in the complexity of the lexical functions they attribute to aspectual verbs and the functions associated with psych verbs. But as we have discussed earlier, psych verbs of the sort used in Katsika et al. (2012) and Lai et al. (2017) and also in the present paper are comparatively simple. So, as far as we know, there is no reason to refrain from asserting the greater complexity of aspectual verbs. And, now that we have brought experimental evidence to bear, the case seems to be increasingly compelling. So, we would advocate for a modification of the SIH to accommodate this perspective.

3.6.3 Aspectual verbs *wancheng (finish)*, *jieshu (finish)* and *jixu (continue)*

To address the SIH claim of exhaustive activation at the verb and ambiguity resolution at the complement being the source of processing costs, the aspectual verbs that allowed Constitutive readings as well as Agentive readings, and those that allowed on Agentive readings were compared against controls, and also against the psych verb condition.

To accomplish these comparisons meant that the numbers of sentence-quadruples had to be reduced from the original 38. Reducing stimuli-sets can easily eliminate any effects obtained with a full set of stimuli. Thus, it is not surprising that a comparison of the verbs that did not

permit a Constitutive reading, which involved reducing the stimuli to only 13 quadruples, should have eliminated all effects. Although the loss of effects might have been due to the fact that these stimuli (*gan* (*rush*) and *tuichi* (*postpone*)) did not allow Constitutive readings, the more likely explanation was that there simply were not enough observations to rule out a null effect.

However, reducing the stimuli to 25 quadruples, as was the case for the aspectual verbs (*wancheng* (*finish*), *jieshu (finish*), and *jixu* (*continue*)), did not eliminate effects. In fact practically all effects that were seen with the full set of stimuli were preserved in the smaller set. In the verb region, the three aspectual verbs were still read significantly more slowly than the psych verbs. And the effects at the NP-complement were also retained.

Therefore, while it is clear that the aspectual verbs that allowed both Constitutive and Agentive readings were as costly as the full set of aspectual verbs, we cannot conclude that the converse is true. That is, we cannot be sure that the aspectual verbs that did not allow both readings had no effect. However, the very fact that subtracting the 'rush' and 'postpone' verbs did not bring about any diminution of the effects observed with the full set of stimuli reinforces SIH claims regarding exhaustive retrieval at the verb and ambiguity resolution at the complement. It provides preliminary support that it is precisely those properties of aspectual verbs that are costly in online processing.

3.7 Conclusion

In the research reported here, we compared the processing of expression with aspectual and psych verbs in Mandarin. Following recent studies in English (e.g., Lai et al., 2017), we found that the Aspectual condition was more costly than controls, but that psych verbs were not. Given that this processing distinction posed a challenge for previous accounts of sentences such

as *John finished the book*, it was important that the finding could be observed by an independent research group and extended to another language.

A striking difference between our results and previous studies in English is that we report an *early* effect between verb types, which was significantly reflected in longer first-pass reading times for aspectual verbs than psych verbs. While the SIH had not proposed any lexical retrieval effect at the verb, our first-pass reading time findings are difficult to ascribe to any other source. So, we suggest that exhaustive activation of functions at the verb does give rise to immediate processing costs.

Finally, by separating the effects of two types of aspectual verbs, those that allow both Agentive and Constitutive readings, and those that allow only Agentive readings, we provide preliminary support for the idea that the processing slowdowns associated with aspectual verb sentences are due to exhaustive activation at the verb and to ambiguity resolution at the complement.

CHAPTER 4. CONTEXT EFFECTS IN THE PROCESSING OF ASPECTUAL VERBS IN MANDARIN

In this chapter, I will report a study exploring how contexts affect the comprehension of aspectual verbs. This study consists of two acceptability judgement tasks and a self-paced reading experiment. I will discuss the implications for the time course of context effects I gain from the findings of this study.

4.1 Introduction

In Chapter 3, I found cross-linguistic evidence supporting the SIH in an eye-tracking study on verb class in Mandarin. Processing costs were found in sentences with aspectual verbs compared with sentences with psychological verbs and control verbs at the verb, the complement, and a post-complement region comprising four Chinese characters following the complement. If the SIH correctly predicts the processing of sentences with aspectual verbs, one crucial aspect of the analysis is the role of context. In the Structured Individual Analysis, aspectual verbs have a set of lexically encoded functions but only in context could an appropriate function be determined that can be applied to the denotation of the complement (Piñango & Deo 2016). In light of this crucial role of context, the same research group investigated how context affects the processing of sentences with aspectual verbs. Lai, & Piñango (2019) and Lai, Braze, & Piñango (2023) carried out an offline acceptability rating task and an online eye-tracking experiment respectively, investigating how biased and non-biased contexts affect the acceptability of sentences with aspectual verbs. The prediction was that if context mattered, expressions with aspectual verbs in a context biased to a single interpretation would be easier to process than in a non-biased context with multiple interpretations. Context effects were found in the offline acceptability rating study as predicted. However, no significant effects were found in

the online eye-tracking study, in which sentences with aspectual verbs in a biased context were found to be as costly as in a non-biased context.

It is not clear why a biasing context facilitated the offline judgments of sentences with aspectual verbs but did not facilitate the online processing of these sentences. Given that the offline and online studies yielded conflicting results, Lai, Braze, & Piñango (2023) claimed that the null results in the eye-tracking study suggested that the exhaustive activation of multiple dimensions should occur regardless of context. Context only *privileged* rather than *predetermined* the lexically encoded dimension functions.

4.1.1 Motivation for the present study

The SIH studies on context mentioned above raise a couple of related questions. First, the mismatch between the results of the online study and the offline study has to be considered. The offline results indicated that a biased context facilitated comprehension of sentences with aspectual verbs, whereas no such context effects facilitated processing in the online study. It is unclear to what extent offline findings reflect online processing, partly because offline results could possibly be affected by a different set of cognitive processes.

To address the problem of why context failed to affect their online results, as alluded to above, Lai, Braze, & Piñango (2023) argued that context merely privileged, but did not predetermine a particular dimension. The range of dimension functions, they concluded, is underspecified, and remains so unless participants are forced to make a choice, as they had to in the offline study.

This argument raises questions about what counts as context. The stimuli in Lai & Piñango (2019) and Lai, Braze, & Piñango (2023) were composed of two parts: (i) context sentences, and (ii) target sentences. For example, from Lai, Braze, & Piñango (2023), a

constitutive-biasing context is provided by the following sentence: *Kevin owns numerous CDs by different jazz musicians.* And the target sentence is: *Dave Brubeck starts this CD of classic Jazz hits.* The context sentence to bias the constitutive reading is one in which "the individual with salient subpart structure … is mentioned".

In this example, context can be roughly described as *inconclusively inferential*. That is, a comprehender is expected to infer from the target sentence that the salient sub-part is part of a compilation, not part of 'numerous CDs'. But this is not the only inference that is possible. Perhaps a more likely inference from the context sentence is that Kevin owns maybe a CD by Miles Davis, a CD by Art Tatum, a CD by Dave Brubeck, and so forth. If that is what a comprehender infers, then the salient sub-part is not mentioned in the context, and arriving at an interpretation of the target sentence is potentially vexed. Given the good performance in offline measures, it appears that it can eventually be figured out that Dave Brubeck must constitute a part of a compilation album, but the non-binding nature of the relation between the context sentence and the target sentence could well have negatively affected online processing.

Given that inconclusive, or 'insufficiently biasing' contexts failed to elicit an online effect in the studies mentioned above, the present study sought to create grammatical contexts that unambiguously bias agentive readings and contrasted them with grammatical contexts that unambiguously allow both agentive and constitutive readings. That is the main goal of the present study.

Based on my study in Chapter 3, in which effects related to aspectual verbs were found in Mandarin Chinese and provided partial support for the SIH, the present study investigated whether context played a role in processing sentences with aspectual verbs in Mandarin. The grammatical contexts were created by using predicational adverbs, since adverbs with different

properties can either reduce the dimension space to a single dimension or not, and therefore could either facilitate processing or not.

4.1.2. Adverbs as grammatical contexts

Predicational adverbs in English are usually composed of an adjective and an *-ly* suffix, taking events or propositions as arguments (Ernst, 2001). Ernst (2001) analyzed two classes of adverbs, subject-oriented adverbs and speaker-oriented adverbs. Subject-oriented adverbs include two subclasses, namely agent-oriented adverbs and mental-attitude adverbs. Agent-oriented adverbs such as *foolishly*, *cleverly*, *aggressively*, etc. take the event and its agent as arguments (Ernst, 2001, p.55). Mental-attitude adverbs such as *reluctantly*, *absent-mindedly*, *calmly*, etc. take an experiencer of the event as the subject and describe a state of mind experienced by the referent of the subject of the verb (Ernst, 2001, p. 63). Another class of adverbs is the speaker-oriented adverbs which was firstly named by Jackendoff (1972). Ernst (2001) furthermore claimed that speaker-oriented adverbs take speech-act, proposition, or fact as their argument. The examples in (4.1) showed how sentences with speaker-oriented adverbs were interpreted when they take different type of argument.

(4.1) a. *Frankly*, would you spend so much money on a bag? (speech-act)

Paraphrase: Tell me frankly, would you spend so much money on a bag?

b. The student has *perhaps* read the textbook. (propostion)

Paraphrase: The proposition that the student has read the book may be true.

c. *Surprisingly*, John adopted a cat. (fact)

Paraphrase: The fact that John adopted a cat is surprising.

The paraphrases in (4.1) indicated that speaker-oriented adverbs do not make any reference to the subject of the verb (Ernst, 2001. P. 69), which is contrary to subject-oriented adverbs.

In the present study, mental-attitude adverbs and speaker-oriented adverbs, as shown in (4.2), were used to construct contrasting contexts for sentences with aspectual verbs.

(4.2) mental-attitude adverbs: *calmly, anxiously, reluctantly, absent-mindedly*, etc.

speaker-oriented adverbs: *surprisingly, appropriately, fortunately, absurdly*, etc.

(Ernst, 2001)

Our rationale for using such verbs was as follows. Taking a sentence with an aspectual verb like (4.3) as an example, the most salient semantic representation of this sentence is the agentive reading: *John began reading/writing the book*. Another possible representation is a constitutive reading: *John is the first character in the book*.

(4.3) John began the book.

Interestingly, if the sentence in (4.3) is combined with different types of adverb, the number of readings available to a native speaker is quite distinct. Consider the sentences in (4.4):

(4.4) a. John surprisingly began the book.

b. John reluctantly began the book.

In (4.4 a), we add a speaker-oriented adverb to (4.3) and we can still get more than one reading, such as *It was surprising that John began reading/writing the book* (agentive reading) or *It was surprising that John is the first character in the book* (constitutive reading). But in (4.4 b), when we add a mental-attitude adverb, the ambiguity disappears, because we can only get the agentive reading, *John reluctantly began reading/writing the book*, while the constitutive reading is unavailable. It seems that mental-attitude adverbs limit the number of semantic representations denoted by aspectual verbs to one.

Therefore, in the present study, two types of adverbs were used to provide context in order to investigate whether context affects real-time processing of sentences with aspectual

verbs. The distinction observed in (4.4) illustrates that sentences with mental-attitude adverbs, such as (4.4 b), generate only one reading, whereas sentences with speaker-oriented adverbs, such as (4.4 b), and sentences without adverbs such as (4.3), do not. Based on this distinction, the prediction is that sentences with mental-attitude adverbs, like (4.4 b), will incur fewer processing costs than sentences with speaker-oriented adverbs, like (4.4 a), and sentences without adverbs like (4.3).

4.1.3 Research Design

The present study aims to investigate the effects of context in sentences with aspectual verbs in Mandarin Chinese. The design of the study is 2 × 3, with the factors of verb type and adverb type, as shown in Table 4.1. In this study, I investigated sentences with aspectual verbs compared with sentences with neutral verbs. In addition, I investigated sentences without adverbs and sentences with speaker-oriented adverbs and mental-attitude adverbs. The hypothesis is that the processing of sentences with mental-attitude adverbs is less costly because only the agentive reading is available (and constitutive readings are not), and so in this condition there should be no ambiguity to resolve. By contrast, the processing of sentences with speaker-oriented adverbs and of those with no adverb could be more costly than sentences with mental-attitude adverbs because both agentive and constitutive readings are available, and so there should be an ambiguity that has to be resolved.

Table 4.1 Conditions: adverb type × verb type

		Adverb Type		
		no adverb	**speaker-oriented adverb**	**mental-attitude adverb**
Verb Type	**aspectual verb**	John began the book.	John surprisingly began the book.	John reluctantly began the book.
	control verb	John read the book.	John surprisingly read the book.	John reluctantly read the book.

4.1.4 A Puzzle in Mandarin Chinese

A subtle difference between English and Mandarin Chinese was discovered that not all of the aspectual verbs used in English studies had corresponding aspectual verbs in Mandarin. That is, not all of them allow an entity-denoting complement. An example is *kaishi* (*begin*) in (4.5).

(4.5) a. * Yuehan kaishi zhe ben xiaoshuo

John begin the CLASSIFIER novel

"John begins the novel."

b. Yuehan kaishi xie zhe ben xiaoshuo

John begin write the CLASSIFIER novel

"John begins writing the novel."

In (4.5 a), *kaishi* ('begin') is followed by an entity *zhe ben xiaoshuo* ('the novel') and it gives rise to an ungrammatical sentence. Similar observations were reported in the literature that the aspectual verb *begin* does not always allow entity-complements in simple declarative sentences in Mandarin (Lin & Liu, 2005; Ma et al., 2022). To render the sentence acceptable, the event needs to be fully explicit, as in (4.5 b). However, it happens that if the sentence structure is changed to (4.6), *kaishi* ('begin') does allow an entity-denoting complement. With a sentence

structure *SHI…LAI…* , *kaishi zhe ben xiaoshuo* (‘begin the novel’) is grammatical.

(4.6) SHI Yuehan LAI kaishi zhe ben xiaoshuo

be John PARTICLE begin the CLASSIFIER novel

“It is john who begins the novel.”

Thus, the first observation is that a sentence structure with *SHI…LAI…* increases the acceptability of a verb phrase that consists of an aspectual verb and an entity-denoting complement in Mandarin Chinese.

A second observation is that with the sentence structure *SHI…LAI…,* constitutive readings become more salient than constitutive readings in non-*SHI...LAI* structures in Mandarin. For example, in (4.7), a constitutive reading could be *John is the last character in the novel*, which is much easier to access in (4.7 b) than (4.7 a).

(4.7) a. Yuehan jieshu zhe ben xiaoshuo

John finish the CLASSIFIER novel

“John finishes the novel”

b. SHI Yuehan LAI jieshu zhe ben xiaoshuo

be John PARTICLE finish the CLASSIFIER novel

“It is John who finishes the novel.”

Shi in Mandarin Chinese was classified as a verb or a focus marker, and the sentence structure *SHI…* was named *the bare shi construction* (Liu & Kempson, 2018). This construction was regarded to be similar to the cleft structure in English and the function of *shi* was claimed to put an emphasis on the focused part following it (Tang, 1983; Xu, 2003). For *lai* in Mandarin, it was usually translated as *come* in English. But in this SHI… LAI… structure, it has nothing to do with the meaning of *come*. Other than being a verb, *lai* was also defined as a focus marker

when it was followed by a VP (Lu, 2006; Li & Li, 2014). Lu (2006) claimed that "*Lai does not show the time course of the action. It does not indicate the result of the action, either. The focus of the sentence generally falls on the method, means, and way to achieve the VP*". However, it is not clear yet why the *SHI…LAI…*structure increases the sentence acceptability and makes it much easier for native Mandarin speakers to access constitutive readings. This is a puzzle for future inquiry. But after failing to identify any reason to be concerned that the structure involves some property that would militate against using it in the present study, I opted for this sentence structure across all conditions. By using the *SHI…LAI…*structure, we are able to test sentences with *kaishi* ('begin'), as well as *jixu* ('continue'), *wancheng* ('finish') and *jieshu* ('finish').

4.2 Methods

4.2.1 Participants

A total of 160 participants were recruited for the pre-tests, and 60 for the self-paced reading experiment. All of the participants recruited for this study fulfilled the following requirements: (1) right-handed, and (2) native Mandarin speaker.

4.2.2 Materials

59 sets of stimuli were initially created. 30 sets of stimuli remained after 7 pre-tests and these were used in the experiments. Each set contained six sentences, one for each of six conditions. Sample stimuli are shown in Table 4.2. All the sentences were randomly distributed to six different lists by using Latin Square design to make sure that participants only read one sentence in each set. The ratio of experimental and filler sentences was 1:2 in the self-paced reading experiment. Each list contained 90 sentences, consisting of 30 experimental sentences and 60 fillers. Half of the fillers were plausible and half implausible. Comprehension questions were simple Yes/No questions and appeared following every sentence.

4.2.3 Pre-tests

A total of 7 pre-tests were carried out, in order to collect matrix verbs for the neutral conditions, to control for the potential influences of frequency, word length of both verbs and adverbs, the predictability of the upcoming noun phrase (NP) complement, the plausibility of stimuli sentences, and the acceptability of different readings across conditions. Data of pre-tests were analyzed in R (R Core Team, 2021)

Table 4.2 Sample stimuli in Mandarin

Conditions	Examples
no adverb- aspectual (NoAdv-Asp)	SHI Yuehan LAI kaishi zhe bu wenxuezuopin keshi qingjie bingbu jingcai. be John PARTICLE begin the CLASSIFIER literature but story not interesting "It is John who begins the literature but the story is not interesting."
no adverb- control (NoAdv control)	SHI Yuehan LAI zhuanxie zhe bu wenxuezuopin keshi qingjie bingbu jingcai. be John PARTICLE write the CLASSIFIER literature but story not interesting "It is John who writes the literature but the story is not interesting."
mental-attitude adverb-aspectual (MA-Asp)	SHI Yuehan buqingbuyuande LAI kaishi zhe bu wenxuezuopin keshi qingjie bingbu jingcai. be John reluctantly PARTICLE begin the CLASSIFIER literature but story not interesting "It is John who reluctantly begins the literature but the story is not interesting."
mental-attitude adverb-control (MA control)	SHI Yuehan buqingbuyuande LAI zhuanxie zhe bu wenxuezuopin keshi qingjie bingbu jingcai. be John reluctantly PARTICLE write the CLASSIFIER literature but story not interesting "It is John who reluctantly writes the literature but the story is not interesting."

Table 4.2 (cont'd)

speaker-oriented adverb-aspectual (SO-Asp)	SHI Yuehan lingrenjingyade LAI kaishi zhe bu wenxuezuopin keshi qingjie bingbu jingcai. be John surprisingly PARTICLE begin the CLASSIFIER literature but story not interesting "It is John who surprisingly begins the literature but the story is not interesting."
speaker-oriented adverb-control (SO control)	SHI Yuehan lingrenjingyade LAI zhuanxie zhe bu wenxuezuopin keshi qingjie bingbu jingcai. be John surprisingly PARTICLE write the CLASSIFIER literature but story not interesting "It is John who surprisingly writes the literature but the story is not interesting."

4.2.3.1 Fill-in-the-blank test

The first pre-test aimed at collecting target verbs in control conditions. 10 participants were recruited in total to take part in an online survey. 60 sentences with aspectual verbs and without adverbs, such as *SHI John LAI finish the novel with a perfect ending* were created prior to the pre-test. These sentences were randomized, and participants were asked to fill in the blank with a suitable verb, as in *SHI John LAI finish ____ the novel with a perfect ending*. Following the procedure that was used in three studies in the field carried out by McElree et al. (2001), Baggio et al. (2010) and Ma et al. (2022), synonyms and near-synonyms among the responses of each sentence were first conflated (Baggio et al., 2010; Ma et al., 2022). And then, 59 verbs were selected because the dominant response occurred more than twice as often as the next most frequent response (McElree et al. 2001; Traxler et al. 2002). The selected verbs occurred on average 8.5 times (out of 10), ranging from 6 to 10. As a result, 59 sentences with aspectual verbs without adverbs were retained, and their corresponding control sentences were created by substituting the aspectual verbs with the neutral verbs collected in this pre-test. Based on the 59 pairs of no-adverb sentences, a pair of speaker-oriented adverb conditions and a pair of mental-attitude adverb conditions were also created.

4.2.3.2 Verb frequency and verb length test

Word frequency and word length of aspectual and control verbs were examined to rule out potential alternative explanations for any observed results. Verb frequencies were collected from BLCU (Beijing Language and Culture University) Corpus Center, which contained 15 billion Chinese characters. Mean verb frequencies were 369615.2 for aspectual verbs, and 407628.5 for control verbs. Mean word lengths were 2.0 for aspectual verbs, and 1.97 for control verbs. Since neither verb frequency data nor verb length data were normally distributed

(examined by a Shapiro-Wilk test with $p < 0.001$), a logarithmic transformation (X'=log(X)) was performed on the data. A two-sample t-test revealed no significant difference in verb frequency between conditions ($t_{(116)} = 1.10$, $p = 0.28$). The mean verb length between conditions was not significantly different, either ($t_{(116)} = 1.43$, $p = 0.16$).

4.2.3.3 Adverb frequency and adverb length test

Based on the 59 pairs of sentences arrived at after the fill-in-the-blank pre-test, 4 adverb conditions were created as mentioned above. A pre-test on word frequency and a pre-test on word length of adverbs were carried out to make sure that these were not different between conditions. Adverb frequencies were collected from BLCU Corpus. The mean adverb frequencies were 1189.6 for mental-attitude adverbs, and 3331.7 for speaker-oriented adverbs. The mean word lengths of adverbs were 3.90 for mental-attitude adverbs, and 3.69 for speaker-oriented adverbs. Neither adverb frequency data nor word length data were normally distributed (examined by a Shapiro-Wilk test with $p < 0.001$), so a logarithmic transformation (X'=log(X)) was performed on the data. A two-sample t-test revealed no significant difference in adverb frequency between conditions ($t_{(116)} = .22$, $p = 0.83$). The mean adverb length between conditions was not significantly different ($t_{(116)} = 1.18$, $p = 0.24$).

4.2.3.4 Plausibility test

A plausibility judgment test was carried out to control for possible differences in sentence plausibility across conditions. 59 sets of stimuli across 6 conditions were divided into 6 lists. A total of 60 participants were recruited, and 10 participants were assigned to each list. Each participant was required to rate sentences on a Likert Scale from 1 (makes no sense) to 5 (makes perfect sense). There was a significant difference between conditions in the plausibility ratings ($p < 0.001$). As a result, sentence sets with low plausibility (rating < 2) were deleted, and 30 sets of

sentences were retained. The mean plausibility ratings of the 30 sets of sentences in the six conditions were 4.2 for the no-adverb aspectual condition, 4.2 for the no-adverb control conditions, 4.1 for the mental-attitude adverb aspectual condition, 3.0 for the mental-attitude adverb control condition, 3.9 for the speaker-oriented adverb aspectual condition, and 4.1 for the speaker-oriented adverb control condition. A repeated measures ANOVA with condition as within-subjects factor did not show significant difference ($p = 0.17$)

4.2.3.5 Cloze probability test

To control for possible differences in the predictability of the NP complement across conditions, a cloze probability test was carried out. Stimuli were divided into 6 lists. 60 different participants were recruited. They were asked to fill in the blank with a classifier and an NP, as in *SHI John LAI finish ___(for classifier) ___(for NP) with a perfect ending*. The reason why the classifier after the determiner was also kept blank was that, in Mandarin, NPs require particular classifiers, so the presence of a classifier will provide a clue as to what the upcoming word might be (Ma et al. 2022). A one-way ANOVA revealed no difference ($p = 0.36$) across conditions.

4.3 Experiment 1: acceptability judgment experiment

An acceptability judgment experiment was carried out to investigate the acceptability of agentive and constitutive readings of sentences with aspectual verbs in various contexts. This offline experiment aimed at investigating whether the different adverb conditions changed the accessibility of readings generated by aspectual verbs.

4.3.1 Method

A forced-choice paradigm was used in which three conditions were examined: (i) a mental-attitude adverb aspectual condition (MA-Asp), (ii) a speaker-oriented adverb aspectual condition (SO-Asp), and (iii) a no-adverb aspectual condition (NoAdv-Asp). The hypothesis was

that participants should accept only an 'agentive' reading when they read sentences in the MA-Asp condition. Based on this hypothesis, the choice of 'constitutive' readings or 'both' readings should occur less frequently in the MA-Asp condition compared with the other two conditions. And the choice of the 'agentive' reading in the MA-Asp condition should occur more frequently than in the other two conditions.

Stimuli were randomized into 3 lists so that none of the participants saw sentences from the same set. Each list contained 30 sentences. A total of 30 participants were recruited, all native Mandarin speakers, right-handed. For each sentence, participants were asked to perform a forced-choice task asking what reading(s) they could accept from the original sentences as *Shi John Lai begins the literature but the story is not interesting*. Choices included an 'agentive' reading like *John begins writing the literature but the story is not interesting*; a 'constitutive' reading like *John is the first character mentioned in the literature but the story is not interesting*, and 'both' readings like *Both paraphrases mentioned above are correct*.

4.3.2 Data analysis

Participants' choices were encoded by *0* and *1* for data analysis, *0* being not choosing a reading and *1* being choosing a reading. For example, in a case that a participant chose 'both' reading, *1* was assigned to the response of 'both' reading, while *0* was assigned to the response of 'constitutive' reading and 'agentive' reading. Since each response was encoded as a binary dataset, Logistic Mixed Effects Models were conducted in R (R Core Team, 2021), with glmer() function in *lme4* package (Bates et al., 2015). Given the complex random effect structure, selection was performed among a series of models increasing the complexity of random effects step by step so as to determine the best-fitting model (Baayen et al., 2008). The goodness-of-fit of the models was compared using the Akaike Information Criterion (AIC) and likelihood ratio

test. Model selection results (see Table 4.3) showed that Model 3 with condition as fixed effect, and by-subject and by-item random intercepts, was the best-fitting model. To determine whether Condition had a significant effect on the model, likelihood ratio tests were used to compare models with and without the fixed effect. Pairwise comparisons were conducted using *lsmeans* package (Lenth, 2016).

Table 4.3 Model selection results suggested that Model 3 with by-subject and by-item random intercepts was the best-fitting model. Four models with condition as the fixed effect and different random effect structure were compared for data of each choice. To determine the best model, the Akaike Information Criterion (AIC) value and likelihood ratio tests were used to estimate the goodness-of-fit. An example of model selection results for choice of 'both' readings is presented below

Model	**Outcome variable**	**Fixed effect**	**Random effects**										
	Response	Condition	By-subject random intercept	By-item random intercept	By-list random intercept	By-subject random slope for condition	By-subject random intercept-slope correlation for condition	d.f.	AIC	logLik	χ^2	d.f.	*P*
Model 1	X	X	X	X	X	X	X	12	991.68	-483.84	8.96	6	0.18
Model 2	X	X	X	X	X			6	988.64	-488.32	7.75	1	1.00

Table 4.3 (cont'd)

Model 3	X	X	X	X	5	986.64	-488.32	6.78	1	0.0092**
Model 4	X	X	X		4	991.42	-491.71			

4.3.3 Results

Results of Experiment 1 are shown in Figure 4.1. For the choice of 'both' readings, a main effect of condition was found ($\chi^2_{(2)} = 19.41$, $p < 0.0001$). A pairwise comparison indicated that the choice of both readings for the NoAdv-Asp condition occurred more frequently than for the MA-Asp condition ($z = 4.23$, $p = 0.0001$). In addition, the choice of 'both' readings for the SO-Asp condition occurred more frequently than for the MA-Asp condition ($z = 3.51$, $p = 0.0014$). There was no significant difference between the NoAdv-Asp condition and the SO-Asp condition ($p > 0.99$).

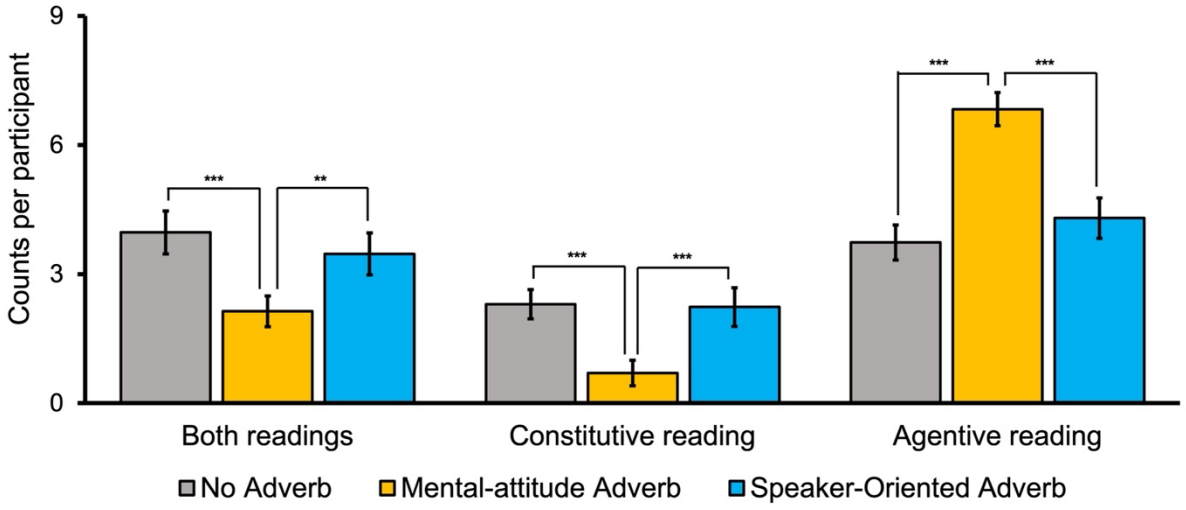

Figure 4.1 Results of the acceptability judgment experiment (p < 0.01, *** p < 0.001). Error bars indicate standard error**

For the choice of 'constitutive' reading, a main effect of condition was found ($\chi^2_{(2)} = 31.92$, $p < 0.0001$). A pairwise comparison indicated that the choice of 'constitutive' reading for the NoAdv-Asp condition occurred more frequently than for the MA-Asp condition ($z = 5.02$, $p < 0.0001$). In addition, the choice of 'constitutive' reading for the SO-Asp condition occurred more frequently than for the MA-Asp condition ($z = 5.11$, $p < 0.0001$). No significant difference between the NoAdv-Asp condition and the SO-Asp condition was found ($p > 0.99$).

For the choice of 'agentive' reading, a main effect of condition was found ($\chi^2_{(2)} = 50.78$, $p < 0.0001$). A pairwise comparison indicated that the choice of 'agentive' reading for the NoAdv-Asp condition occurred less frequently than for the MA-Asp condition ($z = -6.17$, $p < 0.0001$). In addition, the choice of 'agentive' reading for the SO-Asp condition occurred less frequently than for the MA-Asp condition ($z = -6.24$, $p < 0.0001$). No significant difference between the NoAdv-Asp condition and the SO-Asp condition was found ($p > 0.99$).

4.4 Experiment 2: self-paced reading experiment

A moving window self-paced reading experiment was conducted to investigate how adverbs as context affected the real-time processing of aspectual verbs in Mandarin Chinese.

4.4.1 Method

The experiment was programmed in PsychoPy 3 (Peirce, 2019) and carried out on the Pavlovia platform. A total of 65 participants were recruited, all native Mandarin speakers, right-handed. Six lists of stimuli were created with 30 experimental sentences and 60 fillers (30 plausible and 30 implausible) in each list. All stimuli were randomized.

During the experiment, each sentence started with a series of dashes to hide the whole sentence. When participants pressed the space bar on the keyboard, the first set of dashes were replaced by the first Chinese character. By pressing the space bar again, the second chunk of characters appeared, and the first character was hidden by dashes again. By pressing the space bar sequentially, participants read sentences chunk by chunk till the end of the sentence. A Yes/ No comprehension question followed every sentence. Participants pressed *A* or *L* on the keyboard to answer the comprehension questions.

Each sentence was divided into chunks, as in Table 4.4 and Table 4.5. Some chunks contained 1 character while others contained multiple characters. Reading time (RT) was recorded for each chunk.

Table 4.4 Experimental paradigm: the no-adverb conditions

dashes	*RT1*	*RT2*	*RT3*	*RT4*	*RT5*	*RT6*	*RT7*	*RT8*	*RT9*
--------	SHI be	Yuehan John	LAI PARTICLE	kaishi begin	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting
--------	SHI be	Yuehan John	LAI PARTICLE	zhuanxie write	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting

Table 4.5 Experimental paradigm: the adverb conditions

dashes	*RT1*	*RT2*	*RT3*	*RT4*	*RT5*	*RT6*	*RT7*	*RT8*	*RT9*	*RT10*
--------	SHI be	Yuehan John	buqingbuyuande reluctantly	LAI PARTICLE	kaishi begin	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting
--------	SHI be	Yuehan John	buqingbuyuande reluctantly	LAI PARTICLE	zhuan xie write	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting
--------	SHI be	Yuehan John	lingrenjingyade surprisingly	LAI PARTICLE	kaishi begin	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting

Table 4.5 (cont'd)

---	SHI be	Yuehan John	lingrenjingyade surprisingly	LAI PARTICLE	zhuan xie write	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting

4.4.2 Data analysis

For the no-adverb conditions, 5 regions of interest were defined (Table 4.6). For the adverb conditions, 6 regions of interest were defined (Table 4.7). The verb region included the matrix verb. The NP region included the NP complement. All NP complements in all 6 conditions consisted of the same number of characters. The Post 1 region included the 1st and 2nd characters following the NP complement. The Post 2 region included the 3rd and 4th characters following the NP. The Post 3 region included the 5th and 6th characters following the NP. The adverb region included the adverb. Data from all 6 conditions were analyzed together for the Verb, NP, Post 1, Post 2 and Post 3 regions. Regarding the adverb region, data from 4 adverb conditions were analyzed.

A logarithmic transformation (X'= log(X)) was carried out due to the non-normal distribution (examined by a Shapiro-Wilk test with $P < .001$) in all regions of interest. Linear Mixed Effects Models were used to analyze these data by regions in R (R Core Team, 2021), with the lmer() function in the *lme4* package (Bates et al., 2015). Given the complex random effect structure, a backward model selection was performed among a series of models decreasing the complexity of random effects step by step so as to determine the best-fitting model (Baayen et al. 2008). All models have verb type, adverb type and interaction between verb type and adverb type as fixed effects, and by-subject and by-item random intercepts. Complex models have by-list random intercept as well as random slopes, and the interaction of random intercepts and slopes. However, not all complex models successfully converged in all regions. So, we decided to use the simplest model that did so:

reading time (RT) ~ verb type * adverb type + (1|Subject) + (1|Item)

The same model was applied to all regions.

Table 4.6 Regions of interest for the no-adverb conditions

Conditions		**Verb**	**NP**	**Post1**	**Post2**	**Post3**	
no adverb- aspectual (NoAdv-Asp)	SHI Yuehan LAI be John PARTICLE	kaishi begin	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting
	"It is John who begins the literature but the story is not interesting."						
no adverb- control (NoAdv control)	SHI Yuehan LAI be John PARTICLE	zhuanxie write	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting
	"It is John who writes the literature but the story is not interesting."						

Table 4.7 Regions of interest for the adverb conditions

		Adverb		**Verb**	**NP**	**Post1**	**Post2**	**Post3**	
mental-attitude adverb- aspectual (MA-Asp)	SHI Yuehan be John	buqingbuyuande reluctantly	LAI PARTICLE	kaishi begin	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting
	"It is John who reluctantly begins the literature but the story is not interesting."								
mental-attitude adverb- control (MA control)	SHI Yuehan be John	buqingbuyuande reluctantly	LAI PARTICLE	zhuan xie write	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting
	"It is John who reluctantly writes the literature but the story is not interesting."								

Table 4.7 (cont'd)

		Adverb		**Verb**	**NP**	**Post1**	**Post2**	**Post3**	
speaker-oriented adverb- aspectual (SO-Asp)	SHI Yuehan be John	lingrenjingyade surprisingly	LAI PARTICLE	kaishi begin	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting
	"It is John who surprisingly begins the literature but the story is not interesting."								
speaker-oriented adverb- control (SO control)	SHI Yuehan be John	lingrenjingyade surprisingly	LAI PARTICLE	zhuan xie write	zhe bu wenxuezuopin the CLASSIFIER literature	keshi but	qingjie story	bingbu not	jingcai. interesting
	"It is John who surprisingly writes the literature but the story is not interesting."								

For data analyzed in Linear Mixed Effects Models, a Type III analysis of variance was carried out for the fixed effects, using Satterthwaite's method. If a main effect of verb type and/or a main effect of adverb type was found, a pairwise comparison was conducted using *lsmeans* package (Lenth, 2016). If a significant interaction between verb type and adverb type was found, 9 custom contrasts as presented in (4.8) were conducted.

(4.8) The 9 custom contrasts include:

a. 'NoAdv-Asp *vs*. NoAdv control'

b. 'MA-Asp *vs.* MA control'

c. 'SO-Asp *vs.* SO control'

d. 'MA-Asp *vs.* NoAdv-Asp'

e. 'MA-Asp *vs.* SO-Asp'

f. 'SO-Asp *vs.* NoAdv-Asp'

g. 'MA control *vs.* NoAdv control'

h. 'MA control *vs.* SO control'

i. 'SO control *vs.* NoAdv control'

The reasons why data were analyzed in such way are as follows.

Generally speaking, what we are most interested in are the main effect of verb type and the interaction between verb type and adverb type. Regarding the main effect of verb type, we would like to know whether there is a significant difference between sentences with aspectual verbs and sentences with control verbs, so as to see whether the processing costs of aspectual verbs found in Mandarin in the previous literature (Ma et al. 2022) are replicated. Only when the verb type effect was found, can we be licensed to further investigate the context effects in expressions with aspectual verbs. If verb type effect was not found in this experiment, one

possible confound could be that the *SHI… LAI…*structure affected the processing of aspectual verb expressions. But if verb type effect remained in this study and showed that the processing of aspectual verbs was harder than that of control verbs, it would suggest that the *SHI… LAI…* sentence structure does not itself affect the interpretation of aspectual verb expressions. In this case, the *SHI… LAI…*sentence structure would not be a confounding variable affecting the results obtained in this experiment.

When the interaction between verb type and adverb type was found, 9 custom contrasts were conducted as in (4.8). The first 3 contrasts from (4.8), replicated in (4.9) below, were actually looking at verb type effects in three adverb conditions.

(4.9) Contrasts for verb effect:

a. 'NoAdv-Asp *vs.* NoAdv control'

b. 'MA-Asp *vs.* MA control'

c. 'SO-Asp *vs.* SO control'

The first contrast looked at aspectual vs. control verb effects when there was no adverb at all in the sentence. The second contrast looked at the verb effect when there was a speaker-oriented adverb in the sentence. The third contrast looked at the verb effect when there was a mental-attitude adverb in the sentence.

Regarding interactions between verb type and adverb type, this is the key to answering the research question of whether adverbs as context can affect the processing of aspectual verbs. To be more specific, the goal is to know if a mental-attitude adverb as context can facilitate the processing of aspectual verbs, because sentences in the mental-attitude adverb aspectual condition only have an agentive reading. The other type of adverb, the speaker-oriented adverb, allows both agentive and constitutive readings of aspectual verb sentences; thus, it should be

more difficult to process, as should sentences in the no-adverb aspectual condition. In this case, another three contrasts replicated in (4.10) below, were examined.

(4.10) Contrasts for Context effect

d. 'MA-Asp *vs.* NoAdv-Asp'

e. 'MA-Asp *vs.* SO-Asp'

f. 'SO-Asp *vs.* NoAdv-Asp'

If the MA-Asp as context (permitting only one reading) facilitated the processing of aspectual verbs, compared with the SO-Asp condition (permitting two readings), there should be a significant difference in contrast 'e'. Since the NoAdv-Asp condition permits more than one reading, there should be a significant difference in contrast 'd'. Contrast 'f' is predicted to show no difference.

Moreover, three control conditions were compared, as replicated in (4.11) below, which could also help better interpret the results.

(4.11) Contrast of control conditions

g. 'MA control *vs.* NoAdv control'

h. 'MA control *vs.* SO control'

i. 'SO control *vs.* NoAdv control'

The accuracy of comprehension questions was inspected. The accuracy of 5 participants (out of 65) was lower than 80%, suggesting that those 5 participants were not paying attention. So, in total, the data of 60 participants were analyzed.

4.4.3 Results

Results are presented in Table 4.8 with means and standard deviations (SD) by region of interest (ROI).

Region 1: Verb

There were no significant differences in verb type ($p = 0.070$) or adverb type ($p = 0.20$), and no interaction between verb type and adverb type ($p = 0.45$).

Table 4.8 Reading Time (ms) in each ROI. C, MA-A, and NoAdv-C in the table stand for control conditions, mental-attitude adverb-aspectual condition and no adverb-control condition

		Verb Region		
	No adverb	**Speaker-oriented adverb**	**Mental-attitude adverb**	
Aspectual	433.53(222.49)	434.84(225.58)	444.40(191.17)	
Control	422.27(182.76)	428.64(205.53)	431.41(222.92)	
		NP Region		
	No adverb	**Speaker-oriented adverb**	**Mental-attitude adverb**	
Aspectual	486.90(838.08)	401.74(183.38)	411.62(185.05)	
Control	432.96(498.61)	437.44(328.86)	404.03(223.10)	
		Post1 Region		
	No adverb	**Speaker-oriented adverb**	**Mental-attitude adverb**	
Aspectual	707.26(683.99)	653.62(668.93)	669.68(644.56)	>C
Control	618.41(550.11)	637.44(652.05)	605.53(551.45)	
		Post2 Region		
	No adverb	**Speaker-oriented adverb**	**Mental-attitude adverb**	
Aspectual	503.07(246.78)	>MA-A, NoAdv-C 483.25(268.06)	460.35(201.75)	>C
Control	462.39(231.33)	469.44(247.70)	474.44(266.10)	

Table 4.8 (cont'd)

	Post3 Region		
	No adverb	**Speaker-oriented adverb**	**Mental-attitude adverb**
Aspectual	401.91(156.54)	389.19(135.16)	396.12(153.30)
Control	397.58(156.98)	392.39(135.34)	393.04(155.94)
	Adverb Region		
	No adverb	**Speaker-oriented adverb**	**Mental-attitude adverb**
Aspectual	no value	470.24(329.31)	503.64(465.68)
Control	no value	486.01(370.92)	505.28(583.35)

Region 2: NP

There were no significant differences in verb type ($p = 0.39$) or adverb type ($p = 0.72$). A significant interaction of verb type and adverb type was found ($F_{(2, 3479)} = 5.63$, $p = 0.0036$), but no significant difference was found in the pairwise contrasts adjusted by the Bonferroni method.

Region 3: Post 1

A main effect of verb type ($F_{(1, 3476)} = 11.09$, $p = 0.0009$) was found in the Post 1 region. A pairwise comparison indicated that the reading times for the conditions with aspectual verbs were significantly longer than for the conditions with control verbs ($t_{(3476)} = 3.33$. $p = 0.0009$). No significant effects were found in adverb type ($p = 0.15$) and the interaction of verb type and adverb type ($p = 0.21$).

Region 4: Post 2

A main effect of verb type ($F_{(1, 3476)} = 9.45$, $p = 0.0021$) was found in the Post 2 region where the 3rd and 4th characters after NP complement appeared. A pairwise comparison indicated that the reading times for the conditions with aspectual verbs were significantly longer than for the conditions with control verbs ($t_{(3476)} = 3.07$. $p = 0.0021$).

In addition, an interaction between verb type and adverb type ($F_{(2, 3479)} = 6.47$, $p = 0.0016$) was found in the Post 2 region as shown in Figure 4.2. Contrasts indicated that the reading time for the MA-Asp condition was significantly shorter than for the NoAdv-Asp condition ($t_{(3478)} = -4.04$, $p = 0.0005$). It was also found that the reading time for the NoAdv-Asp condition was significantly longer than for the NoAdv control condition ($t_{(3478)} = 4.37$, $p = 0.0001$).

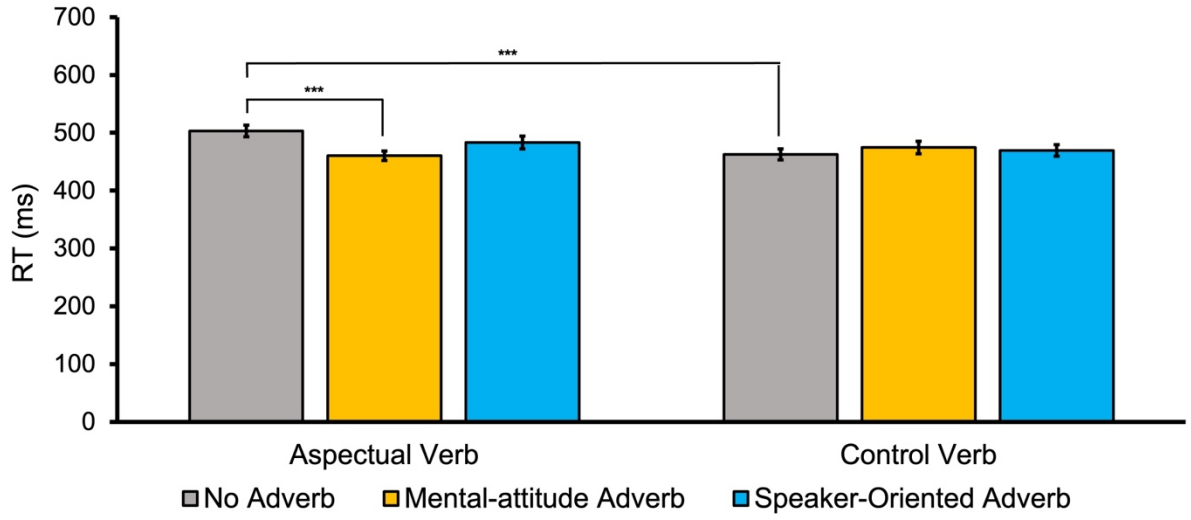

Figure 4.2 Reading times in the Post 2 region (* p < 0.001). Error bars indicate standard error**

Region 5: Post 3

No main effect of verb type ($p = 0.37$) or adverb type ($p = 0.37$) was found in the Post 3 region. Also, there was no interaction between verb type and adverb type ($p = 0.41$).

Region 6: *Adverb*

There were no significant adverb differences across the 4 adverb conditions ($p = 0.42$).

Finally, no significant differences were found at any region between the 3 control conditions (the NoAdv control, the SO control, and the MA control).

In sum, a verb type effect of Asp conditions compared to control conditions was found in the Post 1 and the Post 2 regions, indicating that the processing of sentences with aspectual verbs was more costly than that of sentences with control verbs in Mandarin. A context effect of MA-Asp condition compared to NoAdv-Asp condition was found in the Post 2 region, indicating that by adding mental-attitude adverbs, the processing of sentences with aspectual verbs was facilitated.

4.5 Experiment 3: acceptability judgment post-test

An acceptability judgment post-test was conducted following the self-paced reading experiment. The purpose of the post-test was to help interpret results of the self-paced reading experiment.

4.5.1 Method

Participants for the post-test were the same participants as in the self-paced reading experiment. After finishing the self-paced reading experiment, participants were given time to take a break. Once they were ready for the following task, they pressed the space bar to start the acceptability judgment post-test. The research design and hypotheses were the same as for Experiment 1. The post-test was also a forced-choice task. Stimuli included sentences of three conditions, namely, the MA-Asp condition, the SO-Asp condition, and the NoAdv-Asp condition, divided into 6 lists, as in Experiment 2. Each list contained 15 sentences for each of the three conditions. The post-test stimuli that participants read were the same stimuli that they read in the Experiment 2. The same data analysis was conducted as in Experiment 1.

4.5.2 Data Analysis

The same data analysis was conducted as in Experiment 1. The response of participants was firstly encoded by *0* and *1*, *0* being not choosing a reading and *1* being choosing a reading. Then, backward model selection was performed to select for the best fitting model. Finally, Logistic Mixed Effects Models were conducted by utilizing glmer() function in *lme4* package (Bates et al., 2015). To determine whether Condition had a significant effect on the model, likelihood ratio tests were used to compare models with and without the fixed effect. When a significant main effect was found, pairwise comparisons were conducted using *lsmeans* package (Lenth, 2016).

4.5.3 Results

Results of Experiment 3 are shown in Figure 4.3. For the choice in which both readings are acceptable, a main effect of condition was found ($\chi^2_{(2)} = 110.31$, $p < 0.0001$). A pairwise comparison indicated that the choice of 'both' readings for the NoAdv-Asp condition occurred more frequently than for the MA-Asp condition ($z = 9.52$, $p < 0.0001$). In addition, the choice of 'both' readings for the SO-Asp condition occurred more frequently than for the MA-Asp condition ($z = 8.34$, $p < 0.0001$). There was no significant difference between the NoAdv-Asp condition and the SO-Asp condition ($p = 0.70$).

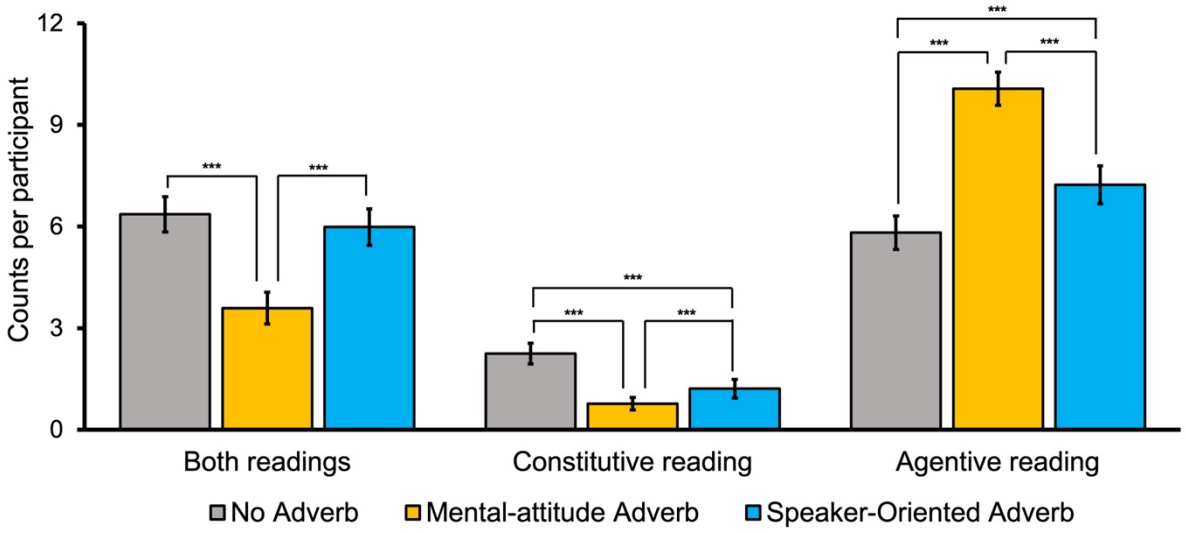

Figure 4.3 Results of the acceptability judgment post-test (* p < .001). Error bars indicate standard error**

For the choice of 'constitutive' reading, a main effect of condition was found ($\chi^2_{(2)} = 66.70$, $p < 0.0001$). A pairwise comparison indicated that the choice of 'constitutive' reading for the NoAdv-Asp condition occurred more frequently than for the MA-Asp condition ($z = 2126.52$, $p < 0.0001$). In addition, the choice of 'constitutive' reading for the SO-Asp condition occurred more frequently than for the MA-Asp condition ($z = 582.20$, $p < 0.0001$). Differing from the results of Experiment 1, a pairwise comparison also indicated that the choice of

'constitutive' reading occurred more frequently for the NoAdv-Asp condition than for the SO-Asp condition ($z = 1303.39$, $p < 0.0001$).

For the choice of 'agentive' reading, a main effect of condition was found ($\chi^2_{(2)} = 209.81$, $p < 0.0001$). A pairwise comparison indicated that choice of 'agentive' reading for the NoAdv-Asp condition occurred less frequently than for the MA-Asp condition ($z = -13.65$, $p < 0.0001$). The choice of 'agentive' reading for the SO-Asp condition occurred less frequently than for the MA-Asp condition ($z = -9.36$, $p < 0.0001$). Moreover, the choice of 'agentive' reading occurred less frequently for the NoAdv-Asp condition than for the SO-Asp condition ($z = -4.72$, $p < 0.0001$).

4.6 Discussion

In the present study, the effect of context in the processing of expressions involving aspectual verbs was investigated in Mandarin. I sought to determine whether context affects the availability of agentive and constitutive readings in an offline behavioral test; and whether context that biases to an agentive reading facilitates the real-time processing of aspectual verb sentences compared to contexts that are non-biasing.

4.6.1 Aspectual conditions compared to control conditions

Significant processing costs were found in the self-paced reading experiment when comparing sentences with aspectual verbs with their controls. Effects were found in the Post 1 region, the 1st and the 2nd characters after the complement, and in the Post 2 region, the 3rd and 4th characters after the complement. The reading times for the aspectual conditions were significantly longer than for the control conditions at both Post 1 and Post 2 regions. The processing costs of expressions with aspectual verbs found in the previous literature (Ma et al. 2022) in Mandarin were successfully replicated, although a *SHI…LAI…*sentence structure was

used in the present study. The replicated effects suggested that the *SHI…LAI…*sentence structure did not affect the processing of aspectual verb expressions in an unexpected way.

4.6.2 NoAdv-Asp condition vs. MA-Asp condition

Results of the offline Acceptability Judgment Experiment (Experiment 1) and the Post-Test (Experiment 3) showed that both agentive and constitutive readings were available for the NoAdv-Asp condition, while interpretation was biased to the agentive reading for the MA-Asp condition. The offline results suggested that mental-attitude adverbs reduced the number of available readings in aspectual verb expressions.

Consistent with the offline results, the online self-paced reading experiment (Experiment 2) found attenuation of processing costs in the MA-Asp condition compared to the NoAdv-Asp condition. The significant difference occurred in the Post 2 region, where NoAdv-Asp sentences were read more slowly than sentences with MA-Asp adverbs.

Processing costs were found in the NoAdv-Asp condition compared to the NoAdv control but were not observed in the MA-Asp condition compared to the MA control. The absence of processing costs suggests that the MA-Asp condition is as easy to process as its control. The attenuation of processing costs is thus interpreted as a context effect in real-time, which is likely due to the fact that MA adverbs as context reduced the available dimensions, and therefore facilitated the processing of aspectual verb sentences. [Note: reducing the readings to only agentive entails reducing the dimensions to one, namely, the eventive dimension. A wide range of dimensions are available with the constitutive reading.]

Integrating the findings of the offline acceptability judgment experiments and the online self-paced reading experiments lends support to the view that grammatical context *predetermine*s the dimension rather than merely *privileges* them, i.e., leaves them all underspecified. Lai, Braze,

& Piñango (2023) proposed that if a biasing context *predetermined* one dimension, the other dimensions would be suppressed, and therefore processing would be facilitated; and if a biasing context merely *privileged* dimensions, all dimensions would still be available, and therefore the online processing of aspectual verb sentences would be as costly as in non-biasing contexts.

Lai & Piñango (2019) found context effects in their *offline* acceptability judgment experiments, but Lai, Braze, & Piñango (2023) found no context effects in their *online* eye-movement experiment. In view of their findings, they argued that all dimensions remained underspecified in online processing, and they were only resolved in offline measures because participants were forced to make a choice.

However, in the present study, context effects *were* found in both offline acceptability judgment experiments and in the online self-paced reading experiment. These findings suggest that mental-attitude adverbs *predetermined* the agentive reading and its associated eventive dimension, and suppressed the range of dimensions associated with a constitutive reading. So, the number of available readings reduced to from two to one, and the activation of multiple dimensions was reduced from many to one.

4.6.3 SO-Asp condition vs. MA-Asp condition

Results of the offline acceptability judgment experiments showed that both agentive and constitutive readings were available in the SO-Asp condition, whereas interpretation was biased to the agentive reading in the MA-Asp condition.

However, in the online experiment, no difference was found between the SO-Asp condition and the MA-Asp condition. This could be due to a limitation of the self-paced reading method, which is less sensitive than other methods, such as eye-tracking, and a less natural form

of reading. Conceivably, the tool was too coarse as a measure of reading to detect subtle differences between the two conditions.

4.6.4 NoAdv-Asp condition vs. SO-Asp condition

No difference between the NoAdv-Asp condition and the SO-Asp condition was found in the Acceptability Judgment Experiment or in the self-paced reading experiment when they were directly compared.

However, results of Experiment 3 regarding the two conditions were a little different from the results of Experiment 1. In Experiment 3 (the post-test), results showed that for the choice of the 'both' reading, the two conditions were the same, but regarding the choice of the 'agentive' reading, it occurred more frequently for the SO-Asp condition compared to the NoAdv-Asp condition. It is the other way around for the choice of the 'constitutive' reading: that reading was chosen less frequently for the SO-Asp condition compared to the NoAdv-Asp condition. The post-test of the self-paced reading results suggested that participants reacted differently to the NoAdv-Asp condition than they did to SO-Asp condition.

Regarding verb type effects in the self-paced reading experiment, a significant difference between the NoAdv-Asp condition and the NoAdv control condition occurred in the Post 2 region. However, verb type effects between the SO-Asp condition and the SO control condition were not found in the Post 2 region.

Given the observed verb type effects in the Post 2 region, it seems that the SO-Asp condition is as easy to process as its control. This suggests that SO adverbs may facilitate processing. By contrast, when we directly compare the NoAdv-Asp condition to the SO-Asp condition, there is no significant difference. Given this null effect of context, it seems that the

SO-Asp condition is as hard to process as the NoAdv-Asp condition. Thus, SO adverbs do *not* seem to facilitate processing. Apparently, the two interpretations are contradictory.

So, the processing of aspectual verb sentences with SO adverbs is a puzzle that cannot be solved in this study, most likely due to the limitations of the self-paced reading method.

4.7 Conclusion

In the research reported here, I investigated the effects of context on the processing of aspectual verb expressions in Mandarin. Two acceptability judgment experiments and one self-paced reading experiment were carried out to give a thorough view of both offline behavioral effects and real-time processing.

The most striking and novel finding is of a real-time effect of context in the processing of aspectual verb sentences. Compared with aspectual verb sentences with no adverb, processing costs for aspectual verb sentences with MA adverbs attenuated real-time processing. This finding partially supports the idea that a grammatical context, such as the one provided by MA adverbs, *predetermines* the eventive dimension rather than keeping a broad range of dimensions open.

The finding is partial because, for the claim to go through completely, sentences with MA adverbs would also take less time to read online than sentences with SO adverbs. But this was not observed. The reason for this non-finding really might be due to the coarse nature of self-paced reading as a tool for examining subtle grammatical distinctions.

CHAPTER 5. CONCLUSION

In this chapter, I will summarize the key findings of this dissertation, conclude the contributions of this dissertation to expanding the understanding of the semantic complexity and context effects, and discuss some recommendations for future research.

5.1 Summary of key findings and contributions

This dissertation aimed to address how semantically complex expressions were comprehended, as well as how and when contexts affected semantic interpretations. Specifically, I investigated the real-time processing of aspectual verbs and psych verbs in Mandarin, and how contexts affected the processing from both offline and online perspectives. The overall results showed that aspectual verbs were more difficult to process than psych verbs in Mandarin due to the immediate exhaustive retrieval of lexically encoded dimensions at the verb and to ambiguity resolution at the complement (Piñango & Deo, 2016). This finding contrasted with the type-shifting account of processing costs associated with phrases such as *begin/enjoy the book*, according to which aspectual verbs and psych verbs were treated as one verb class involving enriched composition which led to the difficulty in processing (McElree et al., 2001; Traxler et al., 2002). Processing costs were found emerging immediately when the aspectual verbs were encountered, which indicated that the lexically encoded dimensions of aspectual verbs were accessed by the processor at the moment when the verbs were read. Moreover, the overall results showed that biasing grammatical contexts facilitated the processing of aspectual verbs immediately, both online and offline.

The first study (Chapter 3) in this dissertation indicated that aspectual verbs and psych verbs in Mandarin belong to two verb classes. Previous literature conflating the two classes of verbs claimed that these verbs were difficult to process due to the inference of some event sense,

whereas the SIH, looking at the verb classes separately, argued that aspectual verbs behaved differently from psych verbs in English such that late effects were found in aspectual verbs compared with psych verbs. Although the SIH claimed that processing costs of aspectual verbs resulted from the exhaustive retrieval of lexically underspecified representations at the verb and the ambiguity resolution at the complement, they did not predict or find any early effects at the verb in their studies, which was inconsistent with the effects relevant to semantic complexity found in other studies.

In view of this inconsistency, I examined the SIH using aspectual verbs and psych verbs in Mandarin. The results showed that aspectual verbs were harder to process than psych verbs. Processing costs were only found in aspectual verbs compared with neutral verbs but not in the psych verbs, which was consistent with the findings in English.

Moreover, I investigated two types of aspectual verbs in Mandarin. One type, exemplified by *jieshu (finish)*, entailed both an agentive reading and a constitutive reading, while the other type, exemplified by *gan (rush)*, only entailed an agentive reading. Interestingly, processing costs were only found for aspectual verbs allowing both readings but not for the other type allowing only one reading, which reinforced the claims of SIH. What was different from previous studies was that in this dissertation I reported an early effect at the aspectual verb. More eye fixations were found when participants encountered the aspectual verbs for the first time compared with the psych verbs and the neutral verbs, suggesting that lexical semantic complexity had immediate consequences in processing.

Based on the finding of processing costs due to aspectual verbs in Mandarin, in the second study (Chapter 4), I continued to investigate context effects. According to the SIH, context plays a crucial role in determining the interpretations of aspectual verbs. Previous

literature found that disambiguating contexts facilitated processing in the offline questionnaire study, whereas no context effects were found in the online eye-movement study.

In an effort to explain the conflicting results, the SIH claimed that either the context effects were *largely delayed*, and thus failed to be observed in real time, or contexts only *privileged* the salient reading without suppressing the alternatives, thus not attenuating the costs (Lai, Braze, & Piñango, 2023).

However, another possible reason for the null result in real time could be that the pragmatic contexts (context sentences) used in earlier studies did not function as expected. So, in this dissertation, I created grammatical contexts by using adverbs in sentences with aspectual verbs.

In the offline study, results showed that the grammatical contexts provided by adverbs affected the interpretation of sentences with aspectual verbs. Strikingly, context effects were found in the online self-paced reading study, too. Results showed that with the context biasing to only one reading (i.e., with mental-attitude adverbs), processing costs of aspectual verbs were eliminated, suggesting that contexts affected the comprehension of semantic complexity immediately in real time. I also argued that in the processing of aspectual verbs, contexts *predetermined* rather than *privileged* the interpretation by suppressing other alternative readings.

In summation, this dissertation expands the understanding of the processing of semantic complexity and the time course of context effects by revealing that the semantic processing of aspectual verbs is costly in both early and late phases and grammatical contexts affect the processing in real time as well as in offline interpretation.

In this dissertation, I investigated the processing of a class of verb that is complex in semantics, i.e., the aspectual verb in Mandarin. The empirical findings of two different patterns

of processing for aspectual verbs and for psych verbs in Mandarin partially support the SIH, a processing model of aspectual verbs originally proposed in English, and moreover, address the unsolved problems in SIH. The novel finding of the early effects at the aspectual verb leads to a conservative modification of the SIH: that exhaustive activation of functions at the aspectual verb gives rise to immediate processing costs. This finding further contributes to the understanding of the semantic complexity effects such that expressions that are complex in semantics can be processed immediately when they are encountered in real time.

With the novel finding of the online context effects associated with grammatical contexts, this dissertation argues for the hypothesis that a biasing context can *predetermine* the interpretation of aspectual verbs rather than keeping a broad range of readings open. Furthermore, this finding of the context effects being observable online contributes to the investigation of the timing of the contextual modulation of meaning such that the contextual constraining can be incorporated in the semantic interpretation of a sentence immediately in real time.

Last but not least, the cross-linguistic investigation of aspectual verbs in this dissertation contributes to the semantic typology on establishing how the semantics of aspectual verbs is different and/or alike across languages.

5.2 Recommendations for future research

There are two gaps of knowledge in the present research that could not be addressed due to limitations of time and scope of this dissertation, so further research would be beneficial.

The first issue involves the context effects of speaker-oriented adverbs online. In the self-paced reading study on context effects reported in Chapter 4, three types of context conditions were created, i.e., a no-adverb condition, a speaker-oriented adverb condition, and a mental-

attitude adverb condition. Mental-attitude adverbs were used as a biasing context as in *John reluctantly began the book* in which only one reading, the agentive reading, was acceptable. So, the mental-attitude adverb condition was predicted to bear no costs typically associated with the need to resolve ambiguous readings. When there was no adverb in the sentence with aspectual verbs as in *John began the book* or when there was a speaker-oriented adverb as in *John surprisingly began the book*, two readings (the agentive reading and the constitutive reading) were acceptable. So, the no-adverb condition and the speaker-oriented adverb condition were predicted to behave similarly, both being harder to process than the mental-attitude condition.

But this was not fully observed. Results did indicate that the no-adverb condition was more costly than the mental-attitude adverb condition. When it came to the speaker-oriented adverb condition, however, it was not significantly different from either the no-adverb condition or the mental-attitude adverb condition. The reason for this non-finding really might be due to the coarse nature of self-paced reading as a tool for examining subtle grammatical distinctions. This issue can be addressed by further studies using more sophisticated methodologies such as eye-tracking and EEG.

The second issue is to do with the *SHI…LAI...* sentence structure in Mandarin, which has been highlighted as a puzzle in Chapter 4. Simple declarative sentences with the combination of *begin* and an entity-denoting complement, such as *John began the book* in English, are not acceptable in Mandarin. By contrast, simple declarative sentences with *finish*, *continue*, or *complete* are good in Mandarin. But I find that by using the *SHI…LAI...* sentence structure, all aspectual verbs in Mandarin are acceptable, including *begin*. In addition to my intuition, the evidence for acceptability in the *SHI…LAI…* structure of sentences with *begin* followed by an entity-denoting complement comes from acceptability judgements by other native Mandarin

speakers. Other aspectual verbs can also be used in this *SHI…LAI…* structure. It is not clear yet why the *SHI…LAI...* sentence structure increases the acceptability of aspectual verb phrases in Mandarin.

Secondly, compared with simple declarative sentences such as *John finishes the book* in Mandarin, it is much easier for native Mandarin speakers to access the constitutive reading (e.g., *John is the last character in the book)* in sentences with the *SHI…LAI...* structure such as *SHI John LAI finishes the book.* It is not clear why the *SHI…LAI...* sentence structure makes the constitutive reading more salient in Mandarin. There is considerable literature on Chinese *SHI* or *SHI…DE*, but very little on the syntactic-semantic analysis of Chinese *LAI*. Further research on *LAI* and its integration with theories accounting for *SHI* will be required in order to shed light on this issue.

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APPENDIX A: EXPERIMENTAL STIMULI IN THE EYE-TRACKING STUDY ON THE PROCESSING OF ASPECTUAL VERBS VS. PSYCH VERBS IN MANDARIN (CHAPTER 3)

A note about the English glosses and translations of the Chinese stimuli. For the glosses, we have used direct translations of Chinese words into English words whenever possible. For the translations, we have attempted to remain faithful to the Chinese interpretation, while also adhering to English grammar and naturalness, which at times has necessitated the addition of a word or phrase. For example, Chinese "*gan*" is glossed as "*rush*", its direct translation, but while the Chinese version of "*John rushed the bus*" is both grammatical and interpretable, the English sentence is not; therefore, we translate the Chinese sentence as "*John rushed to catch the bus*" (corresponding to the intuitive interpretation of the Chinese sentence), even though the Chinese sentence does not contain any correspondent of "*to catch*". Consequently, we caution against relying on the translations when considering the eye-tracking experiment and results, and instead advise focusing on the original Chinese words and their glosses.

1a. zhuming geshou Hanhong jieshu zheqi yinyue heji gequ shifen haoting

famous singer Hanhong finish this CLASSIFIER music collection song very good

'The famous singer Hanhong finishes the music collection and the song is very good.'

1b. zhuming geshou Hanhong luzhi zheqi yinyue heji gequ shifen haoting

famous singer Hanhong record this CLASSIFIER music collection song very good

'The famous singer Hanhong records the music collection and the song is very good.'

1c. zhuming geshou Hanhong xiangshou zheqi yinyue heji gequ shifen haoting.

famous singer Hanhong enjoy this CLASSIFIER music collection song very good

'The famous singer Hanhong enjoys the music collection and the song is very good.'

1d. zhuming geshou Hanhong luzhi zheqi yinyue heji gequ shifen haoting

famous singer Hanhong record this CLASSIFIER music collection song very good

'The famous singer Hanhong records the music collection and the song is very good.'

2a. yiwei yingjun shaonian jieshu zheben wangluo xiaoshuo shenshouwangyou xi'ai

one CLASSIFIER handsome young man finish this CLASSIFIER internet novel loved by netizens

'A handsome young man finishes the internet novel which is loved by netizens.'

2b. yiwei yingjun shaonian zhuanxie zheben wangluo xiaoshuo shenshouwangyou xi'ai

one CLASSIFIER handsome young man write this CLASSIFIER internet novel loved by netizens

'A handsome young man writes the internet novel which is loved by netizens.'

2c. yiwei yingjun shaonian changshi zheben wangluo xiaoshuo shenshouwangyou xi'ai

one CLASSIFIER handsome young man try this CLASSIFIER internet novel loved by netizens

'A handsome young man tries the internet novel which is loved by netizens.'

2d. yiwei yingjun shaonian yuedu zheben wangluo xiaoshuo shenshouwangyou xi'ai

one CLASSIFIER handsome young man read this CLASSIFIER internet novel loved by netizens

'A handsome young man reads the internet novel which is loved by netizens.'

3a. yiwei shuaiqi huashi jieshu zheyiji donghuapian yinqi fensi jida xingqu

one CLASSIFIER good-looking manga artist finish this one CLASSIFIER cartoon arouse fans great interest

‘A good-looking manga artist finishes this episode of a cartoon which arouses great interest from fans.’

3b. yiwei shuaiqi huashi zhizuo zheyiji donghuapian yinqi fensi jida xingqu

one CLASSIFIER good-looking manga artist produce this one CLASSIFIER cartoon arouse fans great interest

‘A good-looking manga artist produces this episode of a cartoon which arouses great interest from fans.’

3c. yiwei shuaiqi huashi changshi zheyiji donghuapian yinqi fensi jida xingqu

one CLASSIFIER good-looking manga artist try this one CLASSIFIER cartoon arouse fans great interest

‘A good-looking manga artist tries this episode of a cartoon which arouses great interest from fans.’

3d. yiwei shuaiqi huashi zhizuo zheyiji donghuapian yinqi fensi jida xingqu

one CLASSIFIER good-looking manga artist produce this one CLASSIFIER cartoon arouse fans great interest

‘A good-looking manga artist produces this episode of a cartoon which arouses great interest from fans.’

4a. qingnian zuojia Zhanglan jieshu zheben sanwen heji ling duzhe powei chayi

young writer Zhanglan finish this CLASSIFIER book of essays make readers very surprised

‘The young writer Zhanglan finishes a book of essays which makes readers very surprised.’

4b. qingnian zuojia Zhanglan zhuanxie zheben sanwen heji ling duzhe powei chayi

young writer Zhanglan write this CLASSIFIER book of essays make readers very surprised

‘The young writer Zhanglan writes a book of essays which makes readers very surprised.’

4c. qingnian zuojia Zhanglan xihuan zheben sanwen heji ling duzhe powei chayi

young writer Zhanglan enjoy this CLASSIFIER book of essays make readers very surprised

'The young writer Zhanglan enjoys a book of essays which makes readers very surprised.'

4d. qingnian zuojia Zhanglan yuedu zheben sanwen heji ling duzhe powei chayi

young writer Zhanglan read this CLASSIFIER book of essays make readers very surprised

'The young writer Zhanglan reads a book of essays which makes readers very surprised.'

5a. Lili he nanpengyou jieshu yichang qingyinyuehui ganjue shifen kaixin

Lili and boyfriend finish one CLASSIFIER light music concert feel very happy

'Lili and her boyfriend finish a light music concert feeling very happy.'

5b. Lili he nanpengyou juban yichang qingyinyuehui ganjue shifen kaixin

Lili and boyfriend hold one CLASSIFIER light music concert feel very happy

'Lili and her boyfriend hold a light music concert feeling very happy.'

5c. Lili he nanpengyou xiangshou yichang qingyinyuehui ganjue shifen kaixin

Lili and boyfriend enjoy one CLASSIFIER light music concert feel very happy

'Lili and her boyfriend enjoy a light music concert feeling very happy.'

5d. Lili he nanpengyou ting yichang qingyinyuehui ganjue shifen kaixin

Lili and boyfriend listen to one CLASSIFIER light music concert feel very happy

'Lili and her boyfriend listen to a light music concert feeling very happy.'

6a. yingguo jujiang baoluo jixu xiaoshuo gaochaozhangjie qiqingjie hehuqingling

British master Paul continue novel climax chapter content logical

'The British maestro Paul continues the climactic chapter of the novel, the content of which is logical.'

6b. yingguo jujiang baoluo zhuanxie xiaoshuo gaochaozhangjie qiqingjie hehuqingling

British master Paul write novel climax chapter content logical

'The British maestro Paul writes the climactic chapter of the novel, the content of which is logical.'

6c. yingguo jujiang baoluo xiangshou xiaoshuo gaochaozhangjie qiqingjie hehuqingling

British master Paul enjoys novel climax chapter content logical

'The British maestro Paul enjoys the climactic chapter of the novel, the content of which is logical.'

6d. yingguo jujiang baoluo yuedu xiaoshuo gaochaozhangjie qiqingjie hehuqingling

British master Paul read novel climax chapter content logical

'The British maestro Paul reads the climactic chapter of the novel, the content of which is logical.'

7a. zhuming xiaotiqinjia jixu zheshou xinchunzuqu shi tingzhong reqinggaozhang

famous violinist continue this CLASSIFIER new-year symphony make audience enthusiastic

'The famous violinist continues the new-year symphony which makes the audience enthusiastic.'

7b. zhuming xiaotiqinjia yanzou zheshou xinchunzuqu shi tingzhong reqinggaozhang

famous violinist play this CLASSIFIER new-year symphony make audience enthusiastic

'The famous violinist plays the new-year symphony which makes the audience enthusiastic.'

7c. zhuming xiaotiqinjia xiangshou zheshou xinchunzuqu shi tingzhong reqinggaozhang

famous violinist enjoy this CLASSIFIER new-year symphony make audience enthusiastic

'The famous violinist enjoys the new-year symphony which makes the audience enthusiastic.'

7d. zhuming xiaotiqinjia yanzou zheshou xinchunzuqu shi tingzhong reqinggaozhang

famous violinist play this CLASSIFIER new-year symphony make audience enthusiastic

'The famous violinist plays the new-year symphony which makes the audience enthusiastic.'

8a. nawei zhuming zuojia wancheng yiben xiaoshuo jijin neirong feichang jingcai

that CLASSIFIER famous author finish one CLASSIFIER fiction book content very interesting

'The author finishes a book of fictions, the content of which is very interesting.'

8b. nawei zhuming zuojia xie yiben xiaoshuo jijin neirong feichang jingcai

that CLASSIFIER famous author write one CLASSIFIER fiction book content very interesting

'The author writes a book of fictions, the content of which is very interesting.'

8c. nawei zhuming zuojia xihuan yiben xiaoshuo jijin neirong feichang jingcai

that CLASSIFIER famous author enjoy one CLASSIFIER fiction book content very interesting

'The author enjoys a book of fictions, the content of which is very interesting.'

8d. nawei zhuming zuojia du yiben xiaoshuo jijin neirong feichang jingcai

that CLASSIFIER famous author read one CLASSIFIER fiction book content very interesting

'The author reads a book of fictions, the content of which is very interesting.'

9a. Wang shifu de tudi wancheng yizuo dongwu mudiao bing litu weimiaoweixiao.

Wang master's student finish one CLASSIFIER animal woodcarving and manage to vivid

'Master Wang's student finishes an animal woodcarving and manages to make it vivid.'

9b. Wang shifu de tudi diaoke yizuo dongwu mudiao bing litu weimiaoweixiao.

Wang master's student carve one CLASSIFIER animal woodcarving and manage to vivid

‘Master Wang's student carves an animal woodcarving and manages to make it vivid.’

9c. Wang shifu de tudi xihuan yizuo dongwu mudiao bing litu weimiaoweixiao.

Wang master's student enjoy one CLASSIFIER animal woodcarving and manage to vivid

‘Master Wang's student enjoys an animal woodcarving and manages to make it vivid.’

9d. Wang shifu he tudi diaoke yizuo dongwu mudiao bing litu weimiaoweixiao.

Wang master and student carve one CLASSIFIER animal woodcarving and manage to vivid

‘Master Wang and his student carves an animal woodcarving and manages to make it vivid.’

10a. zhuming yinyuerenmen wancheng yizhang liuxing changpian dan waijie baobianbuyi

famous musicians finish one CLASSIFIER pop record but public have mixed opinions

‘The famous musicians finish a pop record but the public have mixed opinions.’

10b. zhuming yinyuerenmen zhizuo yizhang liuxing changpian dan waijie baobianbuyi

famous musicians produce one CLASSIFIER pop record but public have mixed opinions

‘The famous musicians produce a pop record but the public have mixed opinions.’

10c. zhuming yinyuerenmen xihuan yizhang liuxing changpian dan waijie baobianbuyi

famous musicians enjoy one CLASSIFIER pop record but public have mixed opinions

‘The famous musicians enjoy a pop record but the public have mixed opinions.’

10d. zhuming yinyuerenmen zhizuo yizhang liuxing changpian dan waijie baobianbuyi

famous musicians produce one CLASSIFIER pop record but public have mixed opinions

‘The famous musicians produce a pop record but the public have mixed opinions.’

11a. nawei nianqing daoyan wancheng zhebu xiju dianying feichang churenyiliao

that CLASSIFIER young director finish this CLASSIFIER comedy film, which is very surprising

‘The young director finishes a comedy which is very surprising.’

11b. nawei nianqing daoyan paishe zhebu xiju dianying feichang churenyiliao

that CLASSIFIER young director shoot this CLASSIFIER comedy film, which is very surprising

'The young director shoots a comedy which is very surprising.'

11c. nawei nianqing daoyan xihuan zhebu xiju dianying feichang churenyiliao

that CLASSIFIER young director enjoy this CLASSIFIER comedy film, which is very surprising

'The young director enjoys a comedy which is very surprising.'

11d. nawei nianqing daoyan guankan zhebu xiju dianying feichang churenyiliao

that CLASSIFIER young director watch this CLASSIFIER comedy film, which is very surprising

'The young director watches a comedy which is very surprising.'

12a. yiwei xin gaodianshimen wancheng zhege shuiguo dangao shifen songruan xiangtian

one CLASSIFIER novice baker finish this CLASSIFIER fruit cake very soft sweet

'A novice baker finishes this fruit cake which is very soft and sweet.'

12b. yiwei xin gaodianshimen zhizuo zhege shuiguo dangao shifen songruan xiangtian

one CLASSIFIER novice baker make this CLASSIFIER fruit cake very soft sweet

'A novice baker makes this fruit cake which is very soft and sweet.'

12c. yiwei xin gaodianshimen xiangshou zhege shuiguo dangao shifen songruan xiangtian

one CLASSIFIER novice baker enjoy this CLASSIFIER fruit cake very soft sweet

'A novice baker enjoys this fruit cake which is very soft and sweet.'

12d. yiwei xin gaodianshimen pinchang zhege shuiguo dangao shifen songruan xiangtian

one CLASSIFIER novice baker taste this CLASSIFIER fruit cake very soft sweet

‘A novice baker tastes this fruit cake which is very soft and sweet.’

13a. zhewei guohua dashi wancheng yifu guohua zuopin juyou jigao shengzhi kongjian

this CLASSIFIER Chinese painting master finish one CLASSIFIER Chinese painting work have extremely high appreciation room

‘The master of Chinese painting finishes a Chinese painting whose value will appreciate greatly.’

13b. zhewei guohua dashi hua yifu guohua zuopin juyou jigao shengzhi kongjian

this CLASSIFIER Chinese painting master paint one CLASSIFIER Chinese painting work have extremely high appreciation room

‘The master of Chinese painting paints a Chinese painting whose value will appreciate greatly.’

13c. zhewei guohua dashi xihuan yifu guohua zuopin juyou jigao shengzhi kongjian

this CLASSIFIER Chinese painting master enjoy one CLASSIFIER Chinese painting work have extremely high appreciation room

‘The master of Chinese painting enjoys a Chinese painting whose value will appreciate greatly.’

13d. zhewei guohua dashi hua yifu guohua zuopin juyou jigao shengzhi kongjian

this CLASSIFIER Chinese painting paint one CLASSIFIER Chinese painting work have extremely high appreciation room

‘The master of Chinese painting paints a Chinese painting whose value will appreciate greatly.’

14a. zhangxiansheng he lianren jieshu zheyiping weishiji yizai chuangbian xinshang yejing

Mr. Zhang and partner finish this CLASSIFIER whiskey leaning at window admire night view

Mr. Zhang and his partner finish this bottle of whiskey, leaning against the window and admiring night view.

14b. zhangxiansheng he lianren pinchang zheyiping weishiji yizai chuangbian xinshang yejing

Mr. Zhang and partner taste this CLASSIFIER whiskey leaning at window admire night view

Mr. Zhang and his partner taste this bottle of whiskey, leaning against the window and admiring night view.

14c. zhangxiansheng he lianren xiangshou zheyiping weishiji yizai chuangbian xinshang yejing

Mr. Zhang and partner enjoy this CLASSIFIER whiskey leaning at window admire night view

Mr. Zhang and his partner enjoy this bottle of whiskey, leaning against the window and admiring night view.

14d. zhangxiansheng he lianren jieshu zheyiping weishiji yizai chuangbian xinshang yejing

Mr. Zhang and partner finish this CLASSIFIER whiskey leaning at window admire night view

Mr. Zhang and his partner finish this bottle of whiskey, leaning against the window and admiring night view.

15a. Ligang jiaoshou zhiqian jieshu yipian keji lunwen neirong huisenandong

Ligang professor before finish one CLASSIFIER scientific paper content difficult to understand

Prof. Ligang has finished a scientific paper, the content of which is difficult to understand.

15b. Ligang jiaoshou zhiqian zhuanxie yipian keji lunwen neirong huisenandong

Ligang professor before write one CLASSIFIER scientific paper content difficult to understand

Prof. Ligang has written a scientific paper, the content of which is difficult to understand.

15c. Ligang jiaoshou zhiqian dichu yipian keji lunwen neirong huisenandong

Ligang professor before resist one CLASSIFIER scientific paper content difficult to understand

Prof. Ligang has resisted a scientific paper, the content of which is difficult to understand.

15d. Ligang jiaoshou zhiqian yuedu yipian keji lunwen neirong huisenandong

Ligang professor before read one CLASSIFIER scientific paper content difficult to understand

Prof. Ligang has read a scientific paper, the content of which is difficult to understand.

16a. zhewei zishen bianji jieshu yipian shelunwenzhang shenru fenxi guojixingshi

this CLASSIFIER senior editor finish one CLASSIFIER editorial article in depth analyze international situation

'The senior editor finishes an editorial article analyzing the international situation in depth.'

16b. zhewei zishen bianji xie yipian shelunwenzhang shenru fenxi guojixingshi

this CLASSIFIER senior editor write one CLASSIFIER editorial article in depth analyze international situation

'The senior editor writes an editorial article analyzing the international situation in depth.'

16c. zhewei zishen bianji xihuan yipian shelunwenzhang shenru fenxi guojixingshi

this CLASSIFIER senior editor enjoy one CLASSIFIER editorial article in depth analyze international situation

‘The senior editor enjoys an editorial article analyzing the international situation in depth.’

16d. zhewei zishen bianji xie yipian shelunwenzhang shenru fenxi guojixingshi

this CLASSIFIER senior editor write one CLASSIFIER editorial article in depth analyze international situation

‘The senior editor writes an editorial article analyzing the international situation in depth.’

17a. Xiaoming often wanshang gan yidui shuxue zuoye he yingyu zuoye

Xiaoming often rush one CLASSIFIER math homework and English homework

‘Xiaoming often rushes a lot of math and English homework.’

17b. Xiaoming often wanshang zuo yidui shuxue zuoye he yingyu zuoye

Xiaoming often do one CLASSIFIER math homework and English homework

‘Xiaoming often does a lot of math and English homework.’

17c. Xiaoming often wanshang kangju yidui shuxue zuoye he yingyu zuoye

Xiaoming often resist one CLASSIFIER math homework and English homework

‘Xiaoming often resists a lot of math and English homework.’

17d. Xiaoming often wanshang zuo yidui shuxue zuoye he yingyu zuoye

Xiaoming often do one CLASSIFIER math homework and English homework

‘Xiaoming often does a lot of math and English homework.

18a. gongsi bailing Xiaowang gan zhetang zhida ditie shifen yongji caoza

company white-collar worker Xiaowang rush this CLASSIFIER express subway train very crowded noisy

‘The company's white-collar worker Xiaowang rushes to catch this express subway train which is very crowded and noisy.’

18b. gongsi bailing Xiaowang dacheng zhetang zhida ditie shifen yongji caoza

company white-collar worker Xiaowang take this CLASSIFIER express subway train very crowded noisy

'The company's white-collar worker Xiaowang takes this express subway train which is very crowded and noisy.'

18c. gongsi bailing Xiaowang dichu zhetang zhida ditie shifen yongji caoza

company white-collar worker Xiaowang resists this CLASSIFIER express subway train very crowded noisy

'The company's white-collar worker Xiaowang resists taking this express subway train which is very crowded and noisy.'

18d. gongsi bailing Xiaowang dacheng zhetang zhida ditie shifen yongji caoza

company white-collar worker Xiaowang take this CLASSIFIER express subway train very crowded noisy

'The company's white-collar worker Xiaowang takes this express subway train which is very crowded and noisy.'

19a. Xiaozhang zuijin jitian gan zhefen jiaji gaojian yinwei shijian duan renwu zhong

Xiaozhang recent days rush this CLASSIFIER urgent manuscript because time short task heavy

'Xiao Zhang has been rushing this urgent manuscript in recent days because of short time and heavy task.'

19b. Xiaozhang zuijin jitian xie zhefen jiaji gaojian yinwei shijian duan renwu zhong

Xiaozhang recent days write this CLASSIFIER urgent manuscript because time short task heavy

‘Xiao Zhang has been writing this urgent manuscript in recent days because of short time and heavy task.’

19c. Xiaozhang zuijin jitian dichu zhefen jiaji gaojian yinwei shijian duan renwu zhong

Xiaozhang recent days resist this CLASSIFIER urgent manuscript because time short task heavy

‘Xiao Zhang has been resisting this urgent manuscript in recent days because of short time and heavy task.’

19d. Xiaozhang zuijin jitian xie zhefen jiaji gaojian yinwei shijian duan renwu zhong

Xiaozhang recent days write this CLASSIFIER urgent manuscript because time short task heavy

‘Xiao Zhang has been writing this urgent manuscript in recent days because of short time and heavy task.’

20a. Lili chuchai zongshi gan zhetang zhida gaotie bu yuanyi zuo feiji

Lili business trip always rush this CLASSIFIER express high-speed train not willing take plane

‘Lili always rushes to catch the express high-speed train, being unwilling to take a plane.’

20b. Lili chuchai zongshi chengzuo zhetang zhida gaotie bu yuanyi zuo feiji

Lili business trip always take this CLASSIFIER express high-speed train not willing take plane

‘Lili always takes the express high-speed train, being unwilling to take a plane.’

20c. Lili chuchai zongshi xihuan zhetang zhida gaotie bu yuanyi zuo feiji

Lili business trip always enjoy this CLASSIFIER express high-speed train not willing take plane

‘Lili always enjoys the express high-speed train, being unwilling to take a plane.’

20d. Lili chuchai zongshi chengzuo zhetang zhida gaotie bu yuanyi zuo feiji

Lili business trip always take this CLASSIFIER express high-speed train not willing take plane

‘Lili always takes the express high-speed train,being unwilling to take a plane.’

21a. Meimei xiatian jingchang gan zhetang zhida gongjiao juede chenei kongqi buhao

Meimei summer often rush this CLASSIFIER express bus feel inside air not good

‘Meimei often rushes to catch this express bus in summer and feels the air inside is not good.’

21b. Meimei xiatian jingchang zuo zhetang zhida gongjiao juede chenei kongqi buhao

Meimei summer often take this CLASSIFIER express bus feel inside air not good

‘Meimei often takes this express bus in summer and feels the air inside is not food.’

21c. Meimei xiatian jingchang kangju zhetang zhida gongjiao juede chenei kongqi buhao

Meimei summer often resist this CLASSIFIER express bus feel inside air not good

‘Meimei often resists this express bus in summer and feels the air inside is not food.’

21d. Meimei xiatian jingchang zuo zhetang zhida gongjiao juede chenei kongqi buhao

Meimei summer often take this CLASSIFIER express bus feel inside air not good

‘Meimei often takes this express bus in summer and feels the air inside is not food.’

22a. zhewei daoyan yiqian gan zhejibu dongzuopian chongchizhe wumaoqian texiao

this CLASSIFIER director before rush these CLASSIFIER action movie with a lot of cheap special effects

‘The director has rushed the making of these action movies with a lot of cheap special effects before.’

22b. zhewei daoyan yiqian paishe zhejibu dongzuopian chongchizhe wumaoqian texiao

this CLASSIFIER director before shoot these CLASSIFIER action movie with a lot of cheap special effects

'The director has shot these action movies with a lot of cheap special effects before.'

22c. zhewei daoyan yiqian dichu zhejibu dongzuopian chongchizhe wumaoqian texiao

this CLASSIFIER director before resist these CLASSIFIER action movie with a lot of cheap special effects

'The director has resisted making these action movies with a lot of cheap special effects before.'

22d. zhewei daoyan yiqian paishe zhejibu dongzuopian chongchizhe wumaoqian texiao

this CLASSIFIER director before shoot these CLASSIFIER action movie with a lot of cheap special effects

'The director has shot these action movies with a lot of cheap special effects before.'

23a. lingyiwei manhuajia jixu zhebu guochan manhua dan faxian yuelaiyue kuzao

another cartoonist continue this CLASSIFIER domestic comics but more and more boring

'Another cartoonist continues the domestic comics but finds it more and more boring.'

23b. lingyiwei manhuajia hua zhebu guochan manhua dan faxian yuelaiyue kuzao

another cartoonist draw this CLASSIFIER domestic comics but more and more boring

'Another cartoonist draws the domestic comics but finds it more and more boring.'

23c. lingyiwei manhuajia xihuan zhebu guochan manhua dan faxian yuelaiyue kuzao

another cartoonist enjoy this CLASSIFIER domestic comics but more and more boring

'Another cartoonist enjoys the domestic comics but finds it more and more boring.'

23d. lingyiwei manhuajia guankan zhebu guochan manhua dan faxian yuelaiyue kuzao

another cartoonist read this CLASSIFIER domestic comics but more and more boring

'Another cartoonist reads the domestic comics but finds it more and more boring.'

24a. Lijiaoshoude xuesheng jixu napian xueshu lunwen bing jueding fangsongxinqing manmanlai

Prof. Li's student continue that CLASSIFIER academic paper and decide relax take time

'Prof. Li's student continues the academic paper and decides to relax and take his time.'

24b. Lijiaoshoude xuesheng zhuanxie napian xueshu lunwen bing jueding fangsongxinqing manmanlai

Prof. Li's student write that CLASSIFIER academic paper and decide relax take time

'Prof. Li's student writes the academic paper and decides to relax and take his time.'

24c. Lijiaoshoude xuesheng xiangshou napian xueshu lunwen bing jueding fangsongxinqing manmanlai

Prof. Li's student enjoy that CLASSIFIER academic paper and decide relax take time

'Prof. Li's student enjoys the academic paper and decides to relax and take his time.'

24d. Lijiaoshoude xuesheng zhuanxie napian xueshu lunwen bing jueding fangsongxinqing manmanlai

Prof. Li's student write that CLASSIFIER academic paper and decide relax take time

'Prof. Li's student writes the academic paper and decides to relax and take his time.'

25a. xinbianji Wang Xiaoling jixu zhetao zhongxuejiaocai bingdui jiaocai jiegou jinxing tiaozheng

new editor Wang Xiaoling continue this CLASSIFIER middle school textbooks and to structure make adjust

'The new editor continues the middle school textbook and adjusts the structure.'

25b. xinbianji Wang Xiaoling shiyong zhetao zhongxuejiaocai bingdui jiaocai jiegou jinxing tiaozheng

new editor Wang Xiaoling use this CLASSIFIER middle school textbooks and to structure make adjust

'The new editor uses the middle school textbook and adjusts the structure.'

25c. xinbianji Wang Xiaoling kangju zhetao zhongxuejiaocai bingdui jiaocai jiegou jinxing tiaozheng

new editor Wang Xiaoling resist this CLASSIFIER middle school textbooks and to structure make adjust

'The new editor resists the middle school textbook and adjusts the structure.'

25d. xinbianji Wang Xiaoling shiyong zhetao zhongxuejiaocai bingdui jiaocai jiegou jinxing tiaozheng

new editor Wang Xiaoling use this CLASSIFIER middle school textbooks and to structure make adjust

'The new editor uses the middle school textbook and adjusts the structure.'

26a. di'erwei gonchengshi jixu zhetao diannao daima yinwei ta jiesheng shijian

second computer engineer continue this CLASSIFIER computer code because it save time

'The second engineer continues this code because it saves time.'

26b. di'erwei gonchengshi shiyong zhetao diannao daima yinwei ta jiesheng shijian

second computer engineer use this CLASSIFIER computer code because it save time

'The second engineer uses this code because it saves time.'

26c. di'erwei gonchengshi xihuan zhetao diannao daima yinwei ta jiesheng shijian

second computer engineer enjoy this CLASSIFIER computer code because it save time

‘The second engineer enjoys this code because it saves time.’

26d. di'erwei gonchengshi shiyong zhetao diannao daima yinwei ta jiesheng shijian

second computer engineer use this CLASSIFIER computer code because it save time

‘The second engineer uses this code because it saves time.’

27a. Mingming he xiaopengyou jieshu zhebu ertong dianying juqing jigaoxiao youganren

Mingming and children finish this CLASSIFIER children's movie content funny touching

‘Mingming and children finish the children's movie, the content of which is both funny and touching.’

27b. Mingming he xiaopengyou kan zhebu ertong dianying juqing jigaoxiao youganren

Mingming and children watch this CLASSIFIER children's movie content funny touching

‘Mingming and children watch the children's movie, the content of which is both funny and touching.’

27c. Mingming he xiaopengyou changshi zhebu ertong dianying juqing jigaoxiao youganren

Mingming and children try this CLASSIFIER children's movie content funny touching

‘Mingming and children try the children's movie, the content of which is both funny and touching.’

27d. Mingming he xiaopengyou kan zhebu ertong dianying juqing jigaoxiao youganren

Mingming and children watch this CLASSIFIER children's movie content funny touching

‘Mingming and children watch the children's movie, the content of which is both funny and touching.’

28a. yanyuande jingjiren jieshu zhefen shangye heyue jieguo geiyanyuan yinlai jiufen

actor's agent finish this CLASSIFIER commercial contract result to actor cause disputes

‘The actor's agent finishes this commercial contract and causes disputes for the actor.’

28b. yanyuande jingjiren lvxing zhefen shangye heyue jieguo geiyanyuan yinlai jiufen

actor's agent perform this CLASSIFIER commercial contract result to actor cause disputes

'The actor's agent performs this commercial contract and causes disputes for the actor.'

28c. yanyuande jingjiren dichu zhefen shangye heyue jieguo geiyanyuan yinlai jiufen

actor's agent resist this CLASSIFIER commercial contract result to actor cause disputes

'The actor's agent resists this commercial contract and causes disputes for the actor.'

28d. yanyuande jingjiren lvxing zhefen shangye heyue jieguo geiyanyuan yinlai jiufen

actor's agent perform this CLASSIFIER commercial contract result to actor cause disputes

'The actor's agent performs this commercial contract and causes disputes for the actor.'

29a. yiwei xinzhuchiren jixu zhege xinwenjiemu shiguanzhong ermuyixin

one CLASSIFIER new host continue this CLASSIFIER news program make audience refresh

'A new host continues this news program which excites the audience.'

29b. yiwei xinzhuchiren zhuchi zhege xinwenjiemu shiguanzhong ermuyixin

one CLASSIFIER new host host this CLASSIFIER news program make audience refresh

'A new host hosts this news program which excites the audience.'

29c. yiwei xinzhuchiren changshi zhege xinwenjiemu shiguanzhong ermuyixin

one CLASSIFIER new host try this CLASSIFIER news program make audience refresh

'A new host tries this news program which excites the audience.'

29d. yiwei xinzhuchiren zhuchi zhege xinwenjiemu shiguanzhong ermuyixin

one CLASSIFIER new host host this CLASSIFIER news program make audience refresh

'A new host hosts this news program which excites the audience.'

30a. dianying gongsi jijiang tuichi zhebu xinde dianying bingjueding xianzuoxuanchuan

film company is about to postpone this CLASSIFIER new film and decide first promote it

'The film company is about to postpone the new film and decides to promote it first.'

30b. dianying gongsi jijiang shangying zhebu xinde dianying bingjueding xianzuoxuanchuan

film company is about to release this CLASSIFIER new film and decide first promote it

'The film company is about to release the new film and decides to promote it first.'

30c .dianying gongsi jijiang changshi zhebu xinde dianying bingjueding xianzuoxuanchuan

film company is about to try this CLASSIFIER new film and decide first promote it

'The film company is about to try the new film and decides to promote it first.'

30d. dianying gongsi jijiang shangying zhebu xinde dianying bingjueding xianzuoxuanchuan

film company is about to release this CLASSIFIER new film and decide first promote it

'The film company is about to release the new film and decides to promote it first.'

31a. baojianpin gongsi yao tuichi zhekuan baojianpin bingdasuan xiandaguanggao

health product company will postpone this CLASSIFIER health product and intend first advertise it

'The health product company will postpone this health product and intends to advertise it first.'

31b. baojianpin gongsi yao chushou zhekuan baojianpin bingdasuan xiandaguanggao

health product company will sell this CLASSIFIER health product and intend first advertise it

'The health product company will sell this health product and intends to advertise it first.'

31c. baojianpin gongsi yao changshi zhekuan baojianpin bingdasuan xiandaguanggao

health product company will try this CLASSIFIER health product and intend first advertise it

'The health product company will try this health product and intends to advertise it first.'

31d. baojianpin gongsi yao chushou zhekuan baojianpin bingdasuan xiandaguanggao

health product company will sell this CLASSIFIER health product and intend first advertise it

'The health product company will sell this health product and intends to advertise it first.'

32a. xinren gongsi zongcai tuichi zhefen shangye hetong kongpajiang sunhai gonsi liyi

new company president postpone this CLASSIFIER commercial contract may harm company interests

'The new president of the company is postponing this commercial contract which may harm the interests of the company.'

32b. xinren gongsi zongcai qiandshu zhefen shangye hetong kongpajiang sunhai gonsi liyi

new company president sign this CLASSIFIER commercial contract may harm company interests

'The new president of the company is signing this commercial contract which may harm the interests of the company.'

32c. xinren gongsi zongcai kangju zhefen shangye hetong kongpajiang sunhai gonsi liyi

new company president resists this CLASSIFIER commercial contract may harm company interests

'The new president of the company is resisting this commercial contract which may harm the interests of the company.'

32d. xinren gongsi zongcai qiandshu zhefen shangye hetong kongpajiang sunhai gonsi liyi

new company president sign this CLASSIFIER commercial contract may harm company interests

‘The new president of the company is signing this commercial contract which may harm the interests of the company.’

33a. yingxiao qihua xiaozu tuichi zhege xinxiangmu bing jinxing duoci taolun

marketing planning team postpone this CLASSIFIER new project and have many times discussion

‘The marketing planning team is postponing this new project and having many discussions.’

33b. yingxiao qihua xiaozu kaizhan zhege xinxiangmu bing jinxing duoci taolun

marketing planning team develop this CLASSIFIER new project and have many times discussion

‘The marketing planning team is developing this new project and having many discussions.’

33c. yingxiao qihua xiaozu kangju zhege xinxiangmu bing jinxing duoci taolun

marketing planning team resists this CLASSIFIER new project and has many times discussion

‘The marketing planning team is resisting this new project and having many discussions.’

33d. yingxiao qihua xiaozu tuijin zhege xinxiangmu bing jinxing duoci taolun

marketing planning team advances this CLASSIFIER new project and has many times discussion

‘The marketing planning team is advancing this new project and having many discussions.’

34a. diannao ruanjian gongsi tuichi zhekuan zhineng ruanjian bing chongxinjiancha gezhong shezhi

computer software company postpone this CLASSIFIER smart software and recheck various settings

‘The software company is postponing the smart software and rechecking various settings.’

34b. diannao ruanjian gongsi fabu zhekuan zhineng ruanjian bing chongxinjianchale gezhong shezhi

computer software company release this CLASSIFIER smart software and recheck various settings

'The software company is releasing the smart software and rechecking various settings.'

34c. diannao ruanjian gongsi changshi zhekuan zhineng ruanjian bing chongxinjianchale gezhong shezhi

computer software company try this CLASSIFIER smart software and recheck various settings

'The software company is trying the smart software and rechecking various settings.'

34d. diannao ruanjian gongsi fabu zhekuan zhineng ruanjian bing chongxinjianchale gezhong shezhi

computer software company release this CLASSIFIER smart software and recheck various settings

'The software company is releasing the smart software and rechecking various settings.'

35a. fuzhuangdian laobanniang tuichi zhepi yangmao dayi bingyou caigou yipi yangrong dayi

Clothing store owner postpones these CLASSIFIER wool coats and purchases one CLASSIFIER cashmere coats

'The owner of the clothing store is postponing these wool coats and purchasing some cashmere coats.'

35b. fuzhuangdian laobanniang chushou zhepi yangmao dayi bingyou caigou yipi yangrong dayi

Clothing store owner sells these CLASSIFIER wool coats and purchases one CLASSIFIER cashmere coats

‘The owner of the clothing store is selling these wool coats and purchasing some cashmere coats.’

35c. fuzhuangdian laobanniang xihuan zhepi yangmao dayi bingyou caigou yipi yangrong dayi

Clothing store owner enjoys these CLASSIFIER wool coats and purchases one CLASSIFIER cashmere coats

‘The owner of the clothing store is enjoying these wool coats and purchasing some cashmere coats.’

35d. fuzhuangdian laobanniang chushou zhepi yangmao dayi bingyou caigou yipi yangrong dayi

Clothing store owner sell these CLASSIFIER wool coats and purchase one CLASSIFIER cashmere coats

‘The owner of the clothing store is selling these wool coats and purchasing some cashmere coats.

36a. yiwei danghong yanyuan jieshu yibu wenyi dianying bing qidai ta jinkuai shangying

one CLASSIFIER popular actor finish one CLASSIFIER art film and look forward it soon release

‘A popular actor finishes an art film and looks forward to its release soon.’

36b. yiwei danghong yanyuan paishe yibu wenyi dianying bing qidai ta jinkuai shangying

one CLASSIFIER popular actor shoot one CLASSIFIER art film and look forward it soon release

‘A popular actor shoots an art film and looks forward to its release soon.’

36c. yiwei danghong yanyuan xiangshou yibu wenyi dianying bing qidai ta jinkuai shangying

one CLASSIFIER popular actor enjoy one CLASSIFIER art film and look forward it soon release

‘A popular actor enjoys an art film and looks forward to its release soon.’

36d. yiwei danghong yanyuan paishe yibu wenyi dianying bing qidai ta jinkuai shangying

one CLASSIFIER popular actor shoot one CLASSIFIER art film and look forward it soon release

‘A popular actor shoots an art film and looks forward to its release soon.’

37a. di'erwei shejishi wancheng yitao qizhuangyifu qingzhu wanshengjie

second designer finish one CLASSIFIER fancy costume celebrate Halloween

‘The second designer finishes a fancy costume to celebrate Halloween.’

37b. di'erwei shejishi zuo yitao qizhuangyifu qingzhu wanshengjie

second designer make one CLASSIFIER fancy costume celebrate Halloween

‘The second designer makes a fancy costume to celebrate Halloween.’

37c. di'erwei shejishi changshi yitao qizhuangyifu qingzhu wanshengjie

second designer try one CLASSIFIER fancy costume celebrate Halloween

‘The second designer tries a fancy costume to celebrate Halloween.’

37d. di'erwei shejishi zuo yitao qizhuangyifu qingzhu wanshengjie

second designer make one CLASSIFIER fancy costume celebrate Halloween

‘The second designer makes a fancy costume to celebrate Halloween.’

38a. zhewei huaju yanyuan tuichi zheyicide juben qie zhaolai zhuanye juzuojia xiugai

this CLASSIFIER drama actor postpone this one CLASSIFIER script and ask professional playwright revise it

‘The drama actor postpones the script and asks a professional playwright to revise it.’

38b. zhewei huaju yanyuan bianxie zheyicide juben qie zhaolai zhuanye juzuojia xiugai

this CLASSIFIER drama actor write this one CLASSIFIER script and ask professional playwright revise it

'The drama actor writes the script and asks a professional playwright to revise it.'

38c. zhewei huaju yanyuan dichu zheyicide juben qie zhaolai zhuanye juzuojia xiugai

this CLASSIFIER drama actor resist this one CLASSIFIER script and ask professional playwright revise it

'The drama actor resists the script and asks a professional playwright to revise it.'

38d. zhewei huaju yanyuan chuyan zheyicide juben qie zhaolai zhuanye juzuojia xiugai

this CLASSIFIER drama actor perform this one CLASSIFIER script and ask professional playwright revise it

'The drama actor performs the script and asks a professional playwright to revise it.'

APPENDIX B: EXPERIMENTAL STIMULI IN THE SELF-PACED READING STUDY ON THE CONTEXT EFFECTS IN MANDARIN (CHAPTER 4)

A note about the English glosses and translations of the Chinese stimuli. For the glosses, we have used direct translations of Chinese words into English words whenever possible. For the translations, we have attempted to remain faithful to the Chinese interpretation, while also adhering to English grammar and naturalness, which at times has necessitated the addition of a word or phrase. Consequently, we caution against relying on the translations when considering the experiments and results, and instead advise focusing on the original Chinese words and their glosses.

1a. SHI Yuehan LAI kaishi zhe bu wenxuezuopin keshi qingjie bingbu jingcai

be John PARTICLE begin the CLASSIFIER literature but story not interesting

'It is John who begins the literature but the story is not interesting.'

1b. SHI Yuehan LAI chuangzuo zhe bu wenxuezuopin keshi qingjie bingbu jingcai

be John PARTICLE write the CLASSIFIER literature but story not interesting

'It is John who writes the literature but the story is not interesting.'

1c. SHI Yuehan buqingbuyuande LAI kaishi zhe bu wenxuezuopin keshi qingjie bingbu jingcai

be John reluctantly PARTICLE begin the CLASSIFIER literature but story not interesting

'It is John who reluctantly begins the literature but the story is not interesting.'

1d. SHI Yuehan buqingbuyuande LAI chuangzuo zhe bu wenxuezuopin keshi qingjie bingbu jingcai

be John reluctantly PARTICLE write the CLASSIFIER literature but story not interesting

'It is John who reluctantly writes the literature but the story is not interesting.'

1e. SHI Yuehan lingrenjingyade LAI kaishi zhe bu wenxuezuopin keshi qingjie bingbu jingcai

be John surprisingly PARTICLE begin the CLASSIFIER literature but story not interesting

'It is John who surprisingly begins the literature but the story is not interesting.'

1f. SHI Yuehan lingrenjingyade LAI chuangzuo zhe bu wenxuezuopin keshi qingjie bingbu jingcai

be John surprisingly PARTICLE write the CLASSIFIER literature but story not interesting

'It is John who surprisingly writes the literature but the story is not interesting.'

2a. SHI Lijiaoshou LAI kaishi zhe pian xueshulunwen yinwei ta zui qingchu zhengge yanjiu xiangmu.

be Prof. Li PARTICLE begin the CLASSIFIER paper because he best know whole research project

'It is Prof. Li who begins the paper because he knows best about the whole research project.'

2b. SHI Lijiaoshou LAI zhuanxie zhe pian xueshulunwen yinwei ta zui qingchu zhengge yanjiu xiangmu.

be Prof. Li PARTICLE write the CLASSIFIER paper because he best know whole research project

'It is Prof. Li who writes the paper because he knows best about the whole research project.'

2c. SHI Lijiaoshou jujinghuishende LAI kaishi zhe pian xueshulunwen yinwei ta zui qingchu zhengge yanjiu xiangmu.

be Prof. Li attentively PARTICLE begin the CLASSIFIER paper because he best know whole research project

'It is Prof. Li who attentively begins the paper because he knows best about the whole research project.'

2d. SHI Lijiaoshou jujinghuishende LAI zhuanxie zhe pian xueshulunwen yinwei ta zui qingchu zhengge yanjiu xiangmu.

be Prof. Li attentively PARTICLE write the CLASSIFIER paper because he best know whole research project

'It is Prof. Li who attentively writes the paper because he knows best about the whole research project.'

2e. SHI Lijiaoshou zhengchangde LAI kaishi zhe pian xueshulunwen yinwei ta zui qingchu zhengge yanjiu xiangmu.

be Prof. Li normally PARTICLE begin the CLASSIFIER paper because he best know whole research project

'It is Prof. Li who normally begins the paper because he knows best about the whole research project.'

2f. SHI Lijiaoshou zhengchangde LAI zhuanxie zhe pian xueshulunwen yinwei ta zui qingchu zhengge yanjiu xiangmu.

be Prof. Li normally PARTICLE zhuanxie the CLASSIFIER paper because he best know whole research project

'It is Prof. Li who normally writes the paper because he knows best about the whole research project.'

3a. SHI Wangmingtongxue LAI kaishi zhe fen xiaozuzuoye keta pingshi duizhemenke zhangwode buhao

be Wangming student PARTICLE begin the CLASSIFIER team assignment but he usually to this class master not well

'It is the student, Wangming, who begins the team assignment but he usually doesn't master this class well.'

3b. SHI Wangmingtongxue LAI xie zhe fen xiaozuzuoye keta pingshi duizhemenke zhangwode buhao

be Wangming student PARTICLE write the CLASSIFIER team assignment but he usually to this class master not well

'It is the student, Wangming, who writes the team assignment but he usually doesn't master this class well.'

3c. SHI Wangmingtongxue jucubuande LAI kaishi zhe fen xiaozuzuoye keta pingshi duizhemenke zhangwode buhao

be Wangming student bashfully PARTICLE begin the CLASSIFIER team assignment but he usually to this class master not well

'It is the student, Wangming, who bashfully begins the team assignment but he usually doesn't master this class well.'

3d. SHI Wangmingtongxue jucubuande LAI xie zhe fen xiaozuzuoye keta pingshi duizhemenke zhangwode buhao

be Wangming student bashfully PARTICLE write the CLASSIFIER team assignment but he usually to this class master not well

'It is the student, Wangming, who bashfully writes the team assignment but he usually doesn't master this class well.'

3e. SHI Wangmingtongxue laolaoshishide LAI kaishi zhe fen xiaozuzuoye keta pingshi duizhemenke zhangwode buhao

be Wangming student honestly PARTICLE begin the CLASSIFIER team assignment but he usually to this class master not well

'It is the student, Wangming, who honestly begins the team assignment but he usually doesn't master this class well.'

3f. SHI Wangmingtongxue laolaoshishide LAI xie zhe fen xiaozuzuoye keta pingshi duizhemenke zhangwode buhao

be Wangming student laolaoshishide PARTICLE write the CLASSIFIER team assignment but he usually to this class master not well

'It is the student, Wangming, who honestly writes the team assignment but he usually doesn't master this class well.'

4a. SHI Wangleizuojia LAI kaishi zhe ben sanwenheji yinwei zheshuoming tazai wentan xiangyoushengyu

be Wanglei author PARTICLE begin the CLASSIFIER essays because this show he in the literary world have high reputation

'It is the author, Wanglei, who begins the essays which shows that he has a high reputation in the literary world.'

4b. SHI Wangleizuojia LAI zhuanxie zhe ben sanwenheji yinwei zheshuoming tazai wentan xiangyoushengyu

be Wanglei author PARTICLE write the CLASSIFIER essays because this show he in the literary world have high reputation

'It is the author, Wanglei, who writes the essays which shows that he has a high reputation in the literary world.'

4c. SHI Wangleizuojia meikaiyanxiaode LAI kaishi zhe ben sanwenheji yinwei zheshuoming tazai wentan xiangyoushengyu

be Wanglei author jovially PARTICLE begin the CLASSIFIER essays because this show he in the literary world have high reputation

'It is the author, Wanglei, who jovially begins the essays which shows that he has a high reputation in the literary world.'

4d. SHI Wangleizuojia meikaiyanxiaode LAI zhuanxie zhe ben sanwenheji yinwei zheshuoming tazai wentan xiangyoushengyu

be Wanglei author jovially PARTICLE write the CLASSIFIER essays because this show he in the literary world have high reputation

'It is the author, Wanglei, who jovially writes the essays which shows that he has a high reputation in the literary world.'

4e. SHI Wangleizuojia heshide LAI kaishi zhe ben sanwenheji yinwei zheshuoming tazai wentan xiangyoushengyu

be Wanglei author appropriately PARTICLE begin the CLASSIFIER essays because this show he in the literary world have high reputation

'It is the author, Wanglei, who appropriately begins the essays which shows that he has a high reputation in the literary world.'

4f. SHI Wangleizuojia heshide LAI zhuanxie zhe ben sanwenheji yinwei zheshuoming tazai wentan xiangyoushengyu

be Wanglei author appropriately PARTICLE write the CLASSIFIER essays because this show he in the literary world have high reputation

'It is the author, Wanglei, who appropriately writes the essays which shows that he has a high reputation in the literary world.'

5a. SHI Luolaoshi LAI kaishi zhexueqidejiaoan jieguo beinianjizuzhang jiuchu haoduo cuowu

be Luo teacher PARTICLE begin this semester syllabus and the grade leader find many mistakes

'It is the teacher, Mr. Luo, who begins the semester syllabus and many mistakes were found by the grade leader.'

5b. SHI Luolaoshi LAI bianxie zhexueqidejiaoan jieguo beinianjizuzhang jiuchu haoduo cuowu

be Luo teacher PARTICLE write this semester syllabus and the grade leader find many mistakes

'It is the teacher, Mr. Luo, who writes the semester syllabus and many mistakes were found by the grade leader.'

5c. SHI Luolaoshi mahude LAI kaishi zhexueqidejiaoan jieguo beinianjizuzhang jiuchu haoduo cuowu

be Luo teacher carelessly PARTICLE begin this semester syllabus and the grade leader find many mistakes

'It is the teacher, Mr. Luo, who carelessly begins the semester syllabus and many mistakes were found by the grade leader.'

5d. SHI Luolaoshi mahude LAI bianxie zhexueqidejiaoan jieguo beinianjizuzhang jiuchu haoduo cuowu

be Luo teacher carelessly PARTICLE write this semester syllabus and the grade leader find many mistakes

'It is the teacher, Mr. Luo, who carelessly writes the semester syllabus and many mistakes were found by the grade leader.'

5e. SHI Luolaoshi buheshide LAI kaishi zhexueqidejiaoan jieguo beinianjizuzhang jiuchu haoduo cuowu

be Luo teacher inappropriately PARTICLE begin this semester syllabus and the grade leader find many mistakes

'It is the teacher, Mr. Luo, who inappropriately begins the semester syllabus and many mistakes were found by the grade leader.'

5f. SHI Luolaoshi buheshide LAI bianxie zhexueqidejiaoan jieguo beinianjizuzhang jiuchu haoduo cuowu

be Luo teacher inappropriately PARTICLE write this semester syllabus and the grade leader find many mistakes

'It is the teacher, Mr. Luo, who inappropriately writes the semester syllabus and many mistakes were found by the grade leader.'

6a. SHI Langlang LAI kaishi zhe shou gudianqumu erhou jiaoxiangyuetuan yejiaruhezou

be Langlang PARTICLE begin the CLASSIFIER classical music then the orchestra as well joins in playing the symphony

'It is Langlang who begins the classical music and then the orchestra joins in playing the symphony as well.'

6b. SHI Langlang LAI tanzou zhe shou gudianqumu erhou jiaoxiangyuetuan yejiaruhezou

be Langlang PARTICLE play the CLASSIFIER classical music then the orchestra as well joins in playing the symphony

'It is Langlang who plays the classical music and then the orchestra joins in playing the symphony as well.'

6c. SHI Langlang tourude LAI kaishi zhe shou gudianqumu erhou jiaoxiangyuetuan yejiaruhezou

be Langlang ecstatically PARTICLE begin the CLASSIFIER classical music then the orchestra as well joins in playing the symphony

'It is Langlang who ecstatically begins the classical music and then the orchestra joins in playing the symphony as well.'

6d. SHI Langlang tourude LAI tanzou zhe shou gudianqumu erhou jiaoxiangyuetuan yejiaruhezou

be Langlang ecstatically PARTICLE play the CLASSIFIER classical music then the orchestra as well joins in playing the symphony

'It is Langlang who ecstatically plays the classical music and then the orchestra joins in playing the symphony as well.'

6e. SHI Langlang lingrengandongde LAI kaishi zhe shou gudianqumu erhou jiaoxiangyuetuan yejiaruhezou

be Langlang movingly PARTICLE begin the CLASSIFIER classical music then the orchestra as well joins in playing the symphony

'It is Langlang who movingly begins the classical music and then the orchestra joins in playing the symphony as well.'

6f. SHI Langlang lingrengandongde LAI tanzou zhe shou gudianqumu erhou jiaoxiangyuetuan yejiaruhezou

be Langlang movingly PARTICLE play the CLASSIFIER classical music then the orchestra as well joins in playing the symphony

'It is Langlang who movingly plays the classical music and then the orchestra joins in playing the symphony as well.'

7a. SHI Wujing LAI kaishi zhe bu aiguodianying yinwei tayouhenduo aiguozhuyi ticaide daibiaozuo

be Wujing PARTICLE begin the CLASSIFIER patriotic film because he has many patriotic themes masterpieces

'It is Wujing who begins the patriotic film because he has many masterpieces on patriotic themes.'

7b. SHI Wujing LAI paishe zhe bu aiguodianying yinwei tayouhenduo aiguozhuyi ticaide daibiaozuo

be Wujing PARTICLE shoot the CLASSIFIER patriotic film because he has many patriotic themes masterpieces

'It is Wujing who shoots the patriotic film because he has many masterpieces on patriotic themes.'

7c. SHI Wujing reqiede LAI kaishi zhe bu aiguodianying yinwei tayouhenduo aiguozhuyi ticaide daibiaozuo

be Wujing eagerly PARTICLE begin the CLASSIFIER patriotic film because he has many patriotic themes masterpieces

'It is Wujing who eagerly begins the patriotic film because he has many masterpieces on patriotic themes.'

7d. SHI Wujing reqiede LAI paishe zhe bu aiguodianying yinwei tayouhenduo aiguozhuyi ticaide daibiaozuo

be Wujing eagerly PARTICLE shoot the CLASSIFIER patriotic film because he has many patriotic themes masterpieces

'It is Wujing who eagerly shoots the patriotic film because he has many masterpieces on patriotic themes.'

7e. SHI Wujing buchusuoliaode LAI kaishi zhe bu aiguodianying yinwei tayouhenduo aiguozhuyi ticaide daibiaozuo

be Wujing unsurprisingly PARTICLE begin the CLASSIFIER patriotic film because he has many patriotic themes masterpieces

'It is Wujing who unsurprisingly begins the patriotic film because he has many masterpieces on patriotic themes.'

7f. SHI Wujing buchusuoliaode LAI paishe zhe bu aiguodianying yinwei tayouhenduo aiguozhuyi ticaide daibiaozuo

be Wujing unsurprisingly PARTICLE shoot the CLASSIFIER patriotic film because he has many patriotic themes masterpieces

'It is Wujing who unsurprisingly shoots the patriotic film because he has many masterpieces on patriotic themes.'

8a. SHI Zhangyuanshi LAI kaishi zhe ge keyanxiangmu yinwei zhegexiangmu guanhu guojiaanquan

be Zhang Academician PARTICLE begin the CLASSIFIER research project because this project about national security

'It is Academician Zhang who begins the research project because this project is about national security.'

8b. SHI Zhangyuanshi LAI fuze zhe ge keyanxiangmu yinwei zhegexiangmu guanhu guojiaanquan

be Zhang Academician PARTICLE be in charge of the CLASSIFIER research project because this project about national security

'It is Academician Zhang who is in charge of the research project because this project is about national security.'

8c. SHI Zhangyuanshi renzhende LAI kaishi zhe ge keyanxiangmu yinwei zhegexiangmu guanhu guojiaanquan

be Zhang Academician carefully PARTICLE begin the CLASSIFIER research project because this project about national security

'It is Academician Zhang who carefully begins the research project because this project is about national security.'

8d. SHI Zhangyuanshi renzhende LAI fuze zhe ge keyanxiangmu yinwei zhegexiangmu guanhu guojiaanquan

be Zhang Academician carefully PARTICLE be in charge of the CLASSIFIER research project because this project about national security

'It is Academician Zhang who is carefully in charge of the research project because this project is about national security.'

8e. SHI Zhangyuanshi mimide LAI kaishi zhe ge keyanxiangmu yinwei zhegexiangmu guanhu guojiaanquan

be Zhang Academician confidentially PARTICLE begin the CLASSIFIER research project because this project about national security

'It is Academician Zhang who confidentially begins the research project because this project is about national security.'

8f. SHI Zhangyuanshi mimide LAI fuze zhe ge keyanxiangmu yinwei zhegexiangmu guanhu guojiaanquan

be Zhang Academician confidentially PARTICLE be in charge of the CLASSIFIER research project because this project about national security

'It is Academician Zhang who is confidentially in charge of the research project because this project is about national security.'

9a. SHI xiaonvhai yizao LAI kaishi dianmenqiande duiwu dengzhe lingqu tangguo yinwei jintianshi wanshengjie

be little girl early in the morning PARTICLE begin the line in front of the store waiting for the candy because it is Halloween

'It is the little girl who starts the line in front of the store early in the morning, waiting for the candy because it is Halloween.'

9b. SHI xiaonvhai yizao LAI jiaru dianmenqiande duiwu dengzhe lingqu tangguo yinwei jintianshi wanshengjie

be little girl early in the morning PARTICLE join the line in front of the store waiting for the candy because it is Halloween

'It is the little girl who joins the line in front of the store early in the morning, waiting for the candy because it is Halloween.'

9c. SHI xiaonvhai yizao haixiude LAI kaishi dianmenqiande duiwu dengzhe lingqu tangguo yinwei jintianshi wanshengjie

be little girl early in the morning bashfully PARTICLE begin the line in front of the store waiting for the candy because it is Halloween

'It is the little girl who bashfully starts the line in front of the store early in the morning, waiting for the candy because it is Halloween.'

9d. SHI xiaonvhai yizao haixiude LAI jiaru dianmenqiande duiwu dengzhe lingqu tangguo yinwei jintianshi wanshengjie

be little girl early in the morning bashfully PARTICLE join the line in front of the store waiting for the candy because it is Halloween

'It is the little girl who bashfully joins the line in front of the store early in the morning, waiting for the candy because it is Halloween.'

9e. SHI xiaonvhai yizao teyi LAI kaishi dianmenqiande duiwu dengzhe lingqu tangguo yinwei jintianshi wanshengjie

be little girl early in the morning specifically PARTICLE begin the line in front of the store waiting for the candy because it is Halloween

'It is the little girl who specifically starts the line in front of the store early in the morning, waiting for the candy because it is Halloween.'

9f. SHI xiaonvhai yizao teyi LAI jiaru dianmenqiande duiwu dengzhe lingqu tangguo yinwei jintianshi wanshengjie

be little girl early in the morning specifically PARTICLE join the line in front of the store waiting for the candy because it is Halloween

'It is the little girl who specifically joins the line in front of the store early in the morning, waiting for the candy because it is Halloween.'

10a. SHI Li Xiaoming LAI kaishi zhe fen houbumingdan bing luoliechu youqianlide duiyuan

be Li Xiaoming PARTICLE begin the CLASSIFIER candidate list and list potential players

'It is Li Xiaoming who starts the candidate list and lists potential players.'

10b. SHI Li Xiaoming LAI tianxie zhe fen houbumingdan bing luoliechu youqianlide duiyuan

be Li Xiaoming PARTICLE fill out the CLASSIFIER candidate list and list potential players

'It is Li Xiaoming who fills out the candidate list and lists potential players.'

10c. SHI Li Xiaoming zhuanxinde LAI kaishi zhe fen houbumingdan bing luoliechu youqianlide duiyuan

be Li Xiaoming attentively PARTICLE begin the CLASSIFIER candidate list and list potential players

'It is Li Xiaoming who attentively starts the candidate list and lists potential players.'

10d. SHI Li Xiaoming zhuanxinde LAI tianxie zhe fen houbumingdan bing luoliechu youqianlide duiyuan

be Li Xiaoming attentively PARTICLE fill out the CLASSIFIER candidate list and list potential players

'It is Li Xiaoming who attentively fills out the candidate list and lists potential players.'

10e. SHI Li Xiaoming kexiaode LAI kaishi zhe fen houbumingdan bing luoliechu youqianlide duiyuan

be Li Xiaoming absurdly PARTICLE begin the CLASSIFIER candidate list and list potential players

'It is Li Xiaoming who absurdly starts the candidate list and lists potential players.'

10f. SHI Li Xiaoming kexiaode LAI tianxie zhe fen houbumingdan bing luoliechu youqianlide duiyuan

be Li Xiaoming absurdly PARTICLE fill out the CLASSIFIER candidate list and list potential players

'It is Li Xiaoming who absurdly fills out the candidate list and lists potential players.'

11a. SHI Zhangjingguan LAI jixu zhe qi yinananjian huizong suoyou xiansuo heziliao

be Zhang officer PARTICLE continue the CLASSIFIER difficult case gather all clue and information

'It is Officer Zhang who continues the difficult case and gathers all the clues and information in.'

11b. SHI Zhangjingguan LAI diaocha zhe qi yinananjian huizong suoyou xiansuo heziliao

be Zhang officer PARTICLE investigate the CLASSIFIER difficult case gather all clue and information

'It is Officer Zhang who investigates the difficult case and gathers all the clues and information in.'

11c. SHI Zhangjingguan jingtide LAI jixu zhe qi yinananjian huizong suoyou xiansuo heziliao

be Zhang officer vigilantly PARTICLE continue the CLASSIFIER difficult case gather all clue and information

'It is Officer Zhang who vigilantly continues the difficult case and gathers all the clues and information in.'

11d. SHI Zhangjingguan jingtide LAI diaocha zhe qi yinananjian huizong suoyou xiansuo heziliao

be Zhang officer vigilantly PARTICLE investigate the CLASSIFIER difficult case gather all clue and information

'It is Officer Zhang who vigilantly investigates the difficult case and gathers all the clues and information in.'

11e. SHI Zhangjingguan lingrenzhenjingde LAI jixu zhe qi yinananjian huizong suoyou xiansuo heziliao

be Zhang officer surprisingly PARTICLE continue the CLASSIFIER difficult case gather all clue and information

'It is Officer Zhang who surprisingly continues the difficult case and gathers all the clues and information in.'

11f. SHI Zhangjingguan lingrenzhenjingde LAI diaocha zhe qi yinananjian huizong suoyou xiansuo heziliao

be Zhang officer surprisingly PARTICLE investigate the CLASSIFIER difficult case gather all clue and information

'It is Officer Zhang who surprisingly investigates the difficult case and gathers all the clues and information in.'

12a. SHI yiwei xinzhubo LAI jixu zhe dang xinwenjiemu shiguanzhong ermuyixin

be one CLASSIFIER new anchor PARTICLE continue the CLASSIFIER news program surprise the audience

'It's a new anchor who continues the news program and surprises the audience.'

12b. SHI yiwei xinzhubo LAI zhuchi zhe dang xinwenjiemu shiguanzhong ermuyixin

be one CLASSIFIER new anchor PARTICLE host the CLASSIFIER news program surprise the audience

'It's a new anchor who hosts the news program and surprises the audience.'

12c. SHI yiwei xinzhubo leyide LAI jixu zhe dang xinwenjiemu shiguanzhong ermuyixin

be one CLASSIFIER new anchor willingly PARTICLE continue the CLASSIFIER news program surprise the audience

'It's a new anchor who willingly continues the news program and surprises the audience.'

12d. SHI yiwei xinzhubo leyide LAI zhuchi zhe dang xinwenjiemu shiguanzhong ermuyixin

be one CLASSIFIER new anchor willingly PARTICLE host the CLASSIFIER news program surprise the audience

'It's a new anchor who willingly hosts the news program and surprises the audience.'

12e. SHI yiwei xinzhubo lingrenyiwaide LAI jixu zhe dang xinwenjiemu shiguanzhong ermuyixin

be one CLASSIFIER new anchor unexpectedly PARTICLE continue the CLASSIFIER news program surprise the audience

'It's a new anchor who unexpectedly continues the news program and surprises the audience.'

12f. SHI yiwei xinzhubo lingrenyiwaide LAI zhuchi zhe dang xinwenjiemu shiguanzhong ermuyixin

be one CLASSIFIER new anchor unexpectedly PARTICLE host the CLASSIFIER news program surprise the audience

'It's a new anchor who unexpectedly hosts the news program and surprises the audience.'

13a. SHI baoluo LAI jixu xiaoshuo gaochaozhangjie qingjie hehuluoji yinrenrusheng

be Paul PARTICLE continue novel climatic chapter content logicao interesting

'It is Paul who continues the climactic chapter of the novel, the content of which is logical and interesting.'

13b. SHI baoluo LAI zhuanxie xiaoshuo gaochaozhangjie qingjie hehuluoji yinrenrusheng

be Paul PARTICLE write novel climatic chapter content logicao interesting

'It is Paul who writes the climactic chapter of the novel, the content of which is logical and interesting.'

13c. SHI baoluo xizhide LAI jixu xiaoshuo gaochaozhangjie qingjie hehuluoji yinrenrusheng

be Paul carefully PARTICLE continue novel climatic chapter content logicao interesting

'It is Paul who carefully continues the climactic chapter of the novel, the content of which is logical and interesting.'

13d. SHI baoluo xizhide LAI zhuanxie xiaoshuo gaochaozhangjie qingjie hehuluoji yinrenrusheng

be Paul carefully PARTICLE write novel climatic chapter content logicao interesting

'It is Paul who carefully writes the climactic chapter of the novel, the content of which is logical and interesting.'

13e. SHI baoluo qiadaohaochude LAI jixu xiaoshuo gaochaozhangjie qingjie hehuluoji yinrenrusheng

be Paul appropriately PARTICLE continue novel climatic chapter content logicao interesting

'It is Paul who appropriately continues the climactic chapter of the novel, the content of which is logical and interesting.'

13f. SHI baoluo qiadaohaochude LAI zhuanxie xiaoshuo gaochaozhangjie qingjie hehuluoji yinrenrusheng

be Paul appropriately PARTICLE write novel climatic chapter content logicao interesting

'It is Paul who appropriately writes the climactic chapter of the novel, the content of which is logical and interesting.'

14a. SHI Lishifudetudi LAI jixu zhe ge renwumudiao suoyi zuizhongde chengpin zhiliangkanyou

be Master Li's student PARTICLE continue the CLASSIFIER character woodcarving so final product quality worrying

'It is Master Li's student who continues the character woodcarving, so the quality of the final product is worrying.'

14b. SHI Lishifudetudi LAI diaoke zhe ge renwumudiao suoyi zuizhongde chengpin zhiliangkanyou

be Master Li's student PARTICLE carve the CLASSIFIER character woodcarving so final product quality worrying

'It is Master Li's student who carves the character woodcarving, so the quality of the final product is worrying.'

14c. SHI Lishifudetudi cuxinde LAI jixu zhe ge renwumudiao suoyi zuizhongde chengpin zhiliangkanyou

be Master Li's student carelessly PARTICLE continue the CLASSIFIER character woodcarving so final product quality worrying

'It is Master Li's student who carelessly continues the character woodcarving, so the quality of the final product is worrying.'

14d. SHI Lishifudetudi cuxince LAI diaoke zhe ge renwumudiao suoyi zuizhongde chengpin zhiliangkanyou

be Master Li's student carelessly PARTICLE carve the CLASSIFIER character woodcarving so final product quality worrying

'It is Master Li's student who carelessly carves the character woodcarving, so the quality of the final product is worrying.'

14e. SHI Lishifudetudi bukaopude LAI jixu zhe ge renwumudiao suoyi zuizhongde chengpin zhiliangkanyou

be Master Li's student roughly PARTICLE continue the CLASSIFIER character woodcarving so final product quality worrying

'It is Master Li's student who roughly continues the character woodcarving, so the quality of the final product is worrying.'

14f. SHI Lishifudetudi bukaopude LAI diaoke zhe ge renwumudiao suoyi zuizhongde chengpin zhiliangkanyou

be Master Li's student roughly PARTICLE carve the CLASSIFIER character woodcarving so final product quality worrying

'It is Master Li's student who roughly carves the character woodcarving, so the quality of the final product is worrying.'

15a. SHI Li Xiaogang LAI jixu zhe bu changpianxiaoshuo bing gousi yixie xijuxingde qingjie

be Li Xiaogang PARTICLE continue the CLASSIFIER novel and conceive some dramatic plots

'It is Li Xiaogang who continues the novel and conceives some dramatic plots.'

15b. SHI Li Xiaogang LAI xie zhe bu changpianxiaoshuo bing gousi yixie xijuxingde qingjie

be Li Xiaogang PARTICLE write the CLASSIFIER novel and conceive some dramatic plots

'It is Li Xiaogang who writes the novel and conceives some dramatic plots.'

15c. SHI Li Xiaogang xinrande LAI jixu zhe bu changpianxiaoshuo bing gousi yixie xijuxingde qingjie

be Li Xiaogang gladly PARTICLE continue the CLASSIFIER novel and conceive some dramatic plots

'It is Li Xiaogang who gladly continues the novel and conceives some dramatic plots.'

15d. SHI Li Xiaogang xinrande LAI xie zhe bu changpianxiaoshuo bing gousi yixie xijuxingde qingjie

be Li Xiaogang gladly PARTICLE write the CLASSIFIER novel and conceive some dramatic plots

'It is Li Xiaogang who gladly writes the novel and conceives some dramatic plots.'

15e. SHI Li Xiaogang xingyunde LAI jixu zhe bu changpianxiaoshuo bing gousi yixie xijuxingde qingjie

be Li Xiaogang luckily PARTICLE continue the CLASSIFIER novel and conceive some dramatic plots

'It is Li Xiaogang who luckily continues the novel and conceives some dramatic plots.'

15f. SHI Li Xiaogang xingyunde LAI xie zhe bu changpianxiaoshuo bing gousi yixie xijuxingde qingjie

be Li Xiaogang luckily PARTICLE write the CLASSIFIER novel and conceive some dramatic plots

'It is Li Xiaogang who luckily writes the novel and conceives some dramatic plots.'

16a. SHI zhuming xiaotiqinjia LAI jixu zhe shou xinchunzuqu shitingzhong reqinggaozhang

be famous violinist LAI continue the CLASSIFIER new-year symphony make audience enthusiastic

'It is the famous violinist who continues the new-year symphony which makes the audience enthusiastic.'

16b. SHI zhuming xiaotiqinjia LAI yanzou zhe shou xinchunzuqu shitingzhong reqinggaozhang

be famous violinist LAI play the CLASSIFIER new-year symphony make audience enthusiastic

'It is the famous violinist who plays the new-year symphony which makes the audience enthusiastic.'

16c. SHI zhuming xiaotiqinjia manhuaixiwangde LAI jixu zhe shou xinchunzuqu shitingzhong reqinggaozhang

be famous violinist hopefully LAI continue the CLASSIFIER new-year symphony make audience enthusiastic

'It is the famous violinist who hopefully continues the new-year symphony which makes the audience enthusiastic.'

16d. SHI zhuming xiaotiqinjia manhuaixiwangde LAI yanzou zhe shou xinchunzuqu shitingzhong reqinggaozhang

be famous violinist hopefully LAI play the CLASSIFIER new-year symphony make audience enthusiastic

'It is the famous violinist who hopefully plays the new-year symphony which makes the audience enthusiastic.'

16e. SHI zhuming xiaotiqinjia bukesiyide LAI jixu zhe shou xinchunzuqu shitingzhong reqinggaozhang

be famous violinist weirdly LAI continue the CLASSIFIER new-year symphony make audience enthusiastic

'It is the famous violinist who weirdly continues the new-year symphony which makes the audience enthusiastic.'

16f. SHI zhuming xiaotiqinjia bukesiyide LAI yanzou zhe shou xinchunzuqu shitingzhong reqinggaozhang

be famous violinist weirdly LAI play the CLASSIFIER new-year symphony make audience enthusiastic

'It is the famous violinist who weirdly plays the new-year symphony which makes the audience enthusiastic.'

17a. SHI Lili LAI jixu jinwandenianyefan keta pingshi bingbushanchang zuofan

be Lili PARTICLE continue tonight New Year's Eve dinner but she usually not good at cooking

'It is Lili who continues the New Year's Eve dinner tonight but she is not usually good at cooking.'

17b. SHI Lili LAI zuo jinwandenianyefan keta pingshi bingbushanchang zuofan

be Lili PARTICLE cook tonight New Year's Eve dinner but she usually not good at cooking

'It is Lili who cooks the New Year's Eve dinner tonight but she is not usually good at cooking.'

17c. SHI Lili xinxinmanmande LAI jixu jinwandenianyefan keta pingshi bingbushanchang zuofan

be Lili confidently PARTICLE continue tonight New Year's Eve dinner but she usually not good at cooking

'It is Lili who confidently continues the New Year's Eve dinner tonight but she is not usually good at cooking.'

17d. SHI Lili xinxinmanmande LAI zuo jinwandenianyefan keta pingshi bingbushanchang zuofan

be Lili confidently PARTICLE cook tonight New Year's Eve dinner but she usually not good at cooking

'It is Lili who confidently cooks the New Year's Eve dinner tonight but she is not usually good at cooking.'

17e. SHI Lili qiguaide LAI jixu jinwandenianyefan keta pingshi bingbushanchang zuofan

be Lili oddly PARTICLE continue tonight New Year's Eve dinner but she usually not good at cooking

'It is Lili who oddly continues the New Year's Eve dinner tonight but she is not usually good at cooking.'

17f. SHI Lili qiguaide LAI zuo jinwandenianyefan keta pingshi bingbushanchang zuofan

be Lili oddly PARTICLE cook tonight New Year's Eve dinner but she usually not good at cooking

'It is Lili who oddly cooks the New Year's Eve dinner tonight but she is not usually good at cooking.'

18a. SHI Wang zhubian LAI wancheng zhe fen jiajigaojian weile nengzai diertiande baozhishang kandeng

be Wang editor PAERTCLE finish the CLASSIFIER urgent manuscript so that it can the next day's newspaper publish

'It is Editor Wang who finishes this urgent manuscript so that it can be published in the next day's newspaper.'

18b. SHI Wang zhubian LAI bianxie zhe fen jiajigaojian weile nengzai diertiande baozhishang kandeng

be Wang editor PAERTCLE write the CLASSIFIER urgent manuscript so that it can the next day's newspaper publish

'It is Editor Wang who writes this urgent manuscript so that it can be published in the next day's newspaper.'

18c. SHI Wang zhubian guzhide LAI wancheng zhe fen jiajigaojian weile nengzai diertiande baozhishang kandeng

be Wang editor obstinately PAERTCLE finish the CLASSIFIER urgent manuscript so that it can the next day's newspaper publish

'It is Editor Wang who obstinately finishes this urgent manuscript so that it can be published in the next day's newspaper.'

18d. SHI Wang zhubian obstinately LAI bianxie zhe fen jiajigaojian weile nengzai diertiande baozhishang kandeng

be Wang editor obstinately PAERTCLE write the CLASSIFIER urgent manuscript so that it can the next day's newspaper publish

'It is Editor Wang who obstinately writes this urgent manuscript so that it can be published in the next day's newspaper.'

18e. SHI Wang zhubian zhuanmen LAI wancheng zhe fen jiajigaojian weile nengzai diertiande baozhishang kandeng

be Wang editor specifically PAERTCLE finish the CLASSIFIER urgent manuscript so that it can the next day's newspaper publish

'It is Editor Wang who specifically finishes this urgent manuscript so that it can be published in the next day's newspaper.'

18f. SHI Wang zhubian zhuanmen LAI bianxie zhe fen jiajigaojian weile nengzai diertiande baozhishang kandeng

be Wang editor specifically PAERTCLE write the CLASSIFIER urgent manuscript so that it can the next day's newspaper publish

'It is Editor Wang who specifically writes this urgent manuscript so that it can be published in the next day's newspaper.'

19a. SHI Liu Huan LAI wancheng zhe zhang liuxingchangpian bing jinxing houqi zhizuo

be Liu Huan PARTICLE finish the CLASSIFIER pop record and go into post production

'It is Liu Huan who finishes the pop record and goes into post-production.'

19b. SHI Liu Huan LAI luzhi zhe zhang liuxingchangpian bing jinxing houqi zhizuo

be Liu Huan PARTICLE record the CLASSIFIER pop record and go into post production

'It is Liu Huan who records the pop record and goes into post-production.'

19c. SHI Liu Huan zhuanzhude LAI wancheng zhe zhang liuxingchangpian bing jinxing houqi zhizuo

be Liu Huan attentively PARTICLE finish the CLASSIFIER pop record and go into post production

'It is Liu Huan who attentively finishes the pop record and goes into post-production.'

19d. SHI Liu Huan zhuanzhude LAI luzhi zhe zhang liuxingchangpian bing jinxing houqi zhizuo

be Liu Huan attentively PARTICLE record the CLASSIFIER pop record and go into post production

'It is Liu Huan who attentively records the pop record and goes into post-production.'

19e. SHI Liu Huan helide LAI wancheng zhe zhang liuxingchangpian bing jinxing houqi zhizuo

be Liu Huan appropriately PARTICLE finish the CLASSIFIER pop record and go into post production

'It is Liu Huan who appropriately finishes the pop record and goes into post-production.'

19f. SHI Liu Huan helide LAI luzhi zhe zhang liuxingchangpian bing jinxing houqi zhizuo

be Liu Huan appropriately PARTICLE record the CLASSIFIER pop record and go into post production

'It is Liu Huan who appropriately records the pop record and goes into post-production.'

20a. SHI guohua dashi LAI wancheng zhe fu guohuazuopin shiqi juyou hengao shoucangjiazhi

be Chinese painting master PARTICLE finish the CLASSIFIER Chinese painting make it have high collection value

'It is the master of Chinese painting who finishes the Chinese painting, making it highly collectible.'

20b. SHI guohua dashi LAI hua zhe fu guohuazuopin shiqi juyou hengao shoucangjiazhi

be Chinese painting master PARTICLE paint the CLASSIFIER Chinese painting make it have high collection value

'It is the master of Chinese painting who paints the Chinese painting, making it highly collectible.'

20c. SHI guohua dashi zhuanxinzhizhide LAI wancheng zhe fu guohuazuopin shiqi juyou hengao shoucangjiazhi

be Chinese painting master attentively PARTICLE finish the CLASSIFIER Chinese painting make it have high collection value

'It is the master of Chinese painting who attentively finishes the Chinese painting, making it highly collectible.'

20d. SHI guohua dashi zhuanxinzhizhide LAI hua zhe fu guohuazuopin shiqi juyou hengao shoucangjiazhi

be Chinese painting master attentively PARTICLE paint the CLASSIFIER Chinese painting make it have high collection value

'It is the master of Chinese painting who attentively paints the Chinese painting, making it highly collectible.'

20e. SHI guohua dashi lingrenchayide LAI wancheng zhe fu guohuazuopin shiqi juyou hengao shoucangjiazhi

be Chinese painting master surprisingly PARTICLE finish the CLASSIFIER Chinese painting make it have high collection value

'It is the master of Chinese painting who surprisingly finishes the Chinese painting, making it highly collectible.'

20f. SHI guohua dashi lingrenchayide LAI hua zhe fu guohuazuopin shiqi juyou hengao shoucangjiazhi

be Chinese painting master surprisingly PARTICLE paint the CLASSIFIER Chinese painting make it have high collection value

'It is the master of Chinese painting who surprisingly paints the Chinese painting, making it highly collectible.'

21a. SHI dachu LAI wancheng zhe zhuo jingzhiguoyan bing yingde waiguobinkede lianliankuazan

be chef PARTICLE finish the CLASSIFIER equisite state banquet and win foreign guests praise

'It is the chef who finishes the exquisite state banquet and wins praise from foreign guests.'

21b. SHI dachu LAI pengren zhe zhuo jingzhiguoyan bing yingde waiguobinkede lianliankuazan

be chef PARTICLE cook the CLASSIFIER equisite state banquet and win foreign guests praise

'It is the chef who cooks the exquisite state banquet and wins praise from foreign guests.'

21c. SHI dachu huangkongbuande LAI wancheng zhe zhuo jingzhiguoyan bing yingde waiguobinkede lianliankuazan

be chef bashfully PARTICLE finish the CLASSIFIER equisite state banquet and win foreign guests praise

'It is the chef who bashfully finishes the exquisite state banquet and wins praise from foreign guests.'

21d. SHI dachu huangkongbuande LAI pengren zhe zhuo jingzhiguoyan bing yingde waiguobinkede lianliankuazan

be chef bashfully PARTICLE cook the CLASSIFIER equisite state banquet and win foreign guests praise

'It is the chef who bashfully cooks the exquisite state banquet and wins praise from foreign guests.'

21e. SHI dachu tebiede LAI wancheng zhe zhuo jingzhiguoyan bing yingde waiguobinkede lianliankuazan

be chef specifically PARTICLE finish the CLASSIFIER equisite state banquet and win foreign guests praise

'It is the chef who specifically finishes the exquisite state banquet and wins praise from foreign guests.'

21f. SHI dachu tebiede LAI pengren zhe zhuo jingzhiguoyan bing yingde waiguobinkede lianliankuazan

be chef specifically PARTICLE cook the CLASSIFIER equisite state banquet and win foreign guests praise

'It is the chef who specifically cooks the exquisite state banquet and wins praise from foreign guests.'

22a. SHI Wu zhuren LAI wancheng bingren yiliaofangan bing baoliu zhuzhiyishide yongyaojianyi

be Director Wu PARTICLE finish patient's prognoses and retain physician's medication recommendations

'It is Director Wu who finishes the patient's prognoses and retains the physician's medication recommendations.'

22b. SHI Wu zhuren LAI zhiding bingren yiliaofangan bing baoliu zhuzhiyishide yongyaojianyi

be Director Wu PARTICLE develop patient's prognoses and retain physician's medication recommendations

'It is Director Wu who develops the patient's prognoses and retains the physician's medication recommendations.'

22c. SHI Wu zhuren zixinmanmande LAI wancheng bingren yiliaofangan bing baoliu zhuzhiyishide yongyaojianyi

be Director Wu confidently PARTICLE finish patient's prognoses and retain physician's medication recommendations

'It is Director Wu who confidently finishes the patient's prognoses and retains the physician's medication recommendations.'

22d. SHI Wu zhuren zixinmanmande LAI zhiding bingren yiliaofangan bing baoliu zhuzhiyishide yongyaojianyi

be Director Wu confidently PARTICLE develop patient's prognoses and retain physician's medication recommendations

'It is Director Wu who confidently develops the patient's prognoses and retains the physician's medication recommendations.'

22e. SHI Wu zhuren lingrenxinfude LAI wancheng bingren yiliaofangan bing baoliu zhuzhiyishide yongyaojianyi

be Director Wu convincingly PARTICLE finish patient's prognoses and retain physician's medication recommendations

'It is Director Wu who convincingly finishes the patient's prognoses and retains the physician's medication recommendations.'

22f. SHI Wu zhuren lingrenxinfude LAI zhiding bingren yiliaofangan bing baoliu zhuzhiyishide yongyaojianyi

be Director Wu convincingly PARTICLE develop patient's prognoses and retain physician's medication recommendations

'It is Director Wu who convincingly develops the patient's prognoses and retains the physician's medication recommendations.'

23a. SHI Liyuanshi LAI wancheng gaijibingde yimiao bing jianfuqi zuguoherenminde qiwang

be Li Academician PARTICLE finish the disease vaccination and shoulder the expectations of the motherland and the people

'It is Academician Li who finishes the vaccination of the disease and shoulders the expectations of the motherland and the people.'

23b. SHI Liyuanshi LAI kaifa gaijibingde yimiao bing jianfuqi zuguoherenminde qiwang

be Li Academician PARTICLE develop the disease vaccination and shoulder the expectations of the motherland and the people

'It is Academician Li who develops the vaccination of the disease and shoulders the expectations of the motherland and the people.'

23c. SHI Liyuanshi renzhende LAI wancheng gaijibingde yimiao bing jianfuqi zuguoherenminde qiwang

be Li Academician carefully PARTICLE finish the disease vaccination and shoulder the expectations of the motherland and the people

'It is Academician Li who carefully finishes the vaccination of the disease and shoulders the expectations of the motherland and the people.'

23d. SHI Liyuanshi renzhende LAI kaifa gaijibingde yimiao bing jianfuqi zuguoherenminde qiwang

be Li Academician carefully PARTICLE develop the disease vaccination and shoulder the expectations of the motherland and the people

'It is Academician Li who carefully develops the vaccination of the disease and shoulders the expectations of the motherland and the people.'

23e. SHI Liyuanshi yansude LAI wancheng gaijibingde yimiao bing jianfuqi zuguoherenminde qiwang

be Li Academician seriously PARTICLE finish the disease vaccination and shoulder the expectations of the motherland and the people

'It is Academician Li who seriously finishes the vaccination of the disease and shoulders the expectations of the motherland and the people.'

23f. SHI Liyuanshi yansude LAI kaifa gaijibingde yimiao bing jianfuqi zuguoherenminde qiwang

be Li Academician seriously PARTICLE develop the disease vaccination and shoulder the expectations of the motherland and the people

'It is Academician Li who seriously develops the vaccination of the disease and shoulders the expectations of the motherland and the people.'

24a. SHI Cai Minglaoshi LAI jieshu zhe ge chunwanxiaopin wanhuile nianqingyanyuande yanchu shiwu

be Ms. Cai Ming PARTICLE finish the CLASSIFIER Spring Festival Gala program recover performance mistakes of young actors

'It is Ms. Cai Ming who finishes the Spring Festival Gala program, recovering the performance mistakes of young actors.'

24b. SHI Cai Minglaoshi LAI biaoyan zhe ge chunwanxiaopin wanhuile nianqingyanyuande yanchu shiwu

be Ms. Cai Ming PARTICLE perform the CLASSIFIER Spring Festival Gala program recover performance mistakes of young actors

'It is Ms. Cai Ming who performs the Spring Festival Gala program, recovering the performance mistakes of young actors.'

24c. SHI Cai Minglaoshi lengjingde LAI jieshu zhe ge chunwanxiaopin wanhuile nianqingyanyuande yanchu shiwu

be Ms. Cai Ming calmly PARTICLE finish the CLASSIFIER Spring Festival Gala program recover performance mistakes of young actors

'It is Ms. Cai Ming who calmly finishes the Spring Festival Gala program, recovering the performance mistakes of young actors.'

24d. SHI Cai Minglaoshi lengjingde LAI biaoyan zhe ge chunwanxiaopin wanhuile nianqingyanyuande yanchu shiwu

be Ms. Cai Ming calmly PARTICLE perform the CLASSIFIER Spring Festival Gala program recover performance mistakes of young actors

'It is Ms. Cai Ming who calmly performs the Spring Festival Gala program, recovering the performance mistakes of young actors.'

24e. SHI Cai Minglaoshi qiadangde LAI jieshu zhe ge chunwanxiaopin wanhuile nianqingyanyuande yanchu shiwu

be Ms. Cai Ming appropriately PARTICLE finish the CLASSIFIER Spring Festival Gala program recover performance mistakes of young actors

'It is Ms. Cai Ming who appropriately finishes the Spring Festival Gala program, recovering the performance mistakes of young actors.'

24f. SHI Cai Minglaoshi qiadangde LAI biaoyan zhe ge chunwanxiaopin wanhuile nianqingyanyuande yanchu shiwu

be Ms. Cai Ming appropriately PARTICLE perform the CLASSIFIER Spring Festival Gala program recover performance mistakes of young actors

'It is Ms. Cai Ming who appropriately performs the Spring Festival Gala program, recovering the performance mistakes of young actors.'

25a. SHI yiwei nvyanyuan LAI jieshu zhe qi zongyijiemu bingxiangguanzhou zhanshile pingyijinrendeyimian

be one CLASSIFIER actress PARTICLE finish the CLASSIFIER variety program and to the audience show a nice side

'It is an actress who finishes the variety program and shows the audience her nice side.'

25b. SHI yiwei nvyanyuan LAI canyu zhe qi zongyijiemu bingxiangguanzhou zhanshile pingyijinrendeyimian

be one CLASSIFIER actress PARTICLE participate in the CLASSIFIER variety program and to the audience show a nice side

'It is an actress who participates in the variety program and shows the audience her nice side.'

25c. SHI yiwei nvyanyuan manxinhuanxide LAI jieshu zhe qi zongyijiemu bingxiangguanzhou zhanshile pingyijinrendeyimian

be one CLASSIFIER actress gladly PARTICLE finish the CLASSIFIER variety program and to the audience show a nice side

'It is an actress who gladly finishes the variety program and shows the audience her nice side.'

25d. SHI yiwei nvyanyuan manxinhuanxide LAI canyu zhe qi zongyijiemu bingxiangguanzhou zhanshile pingyijinrendeyimian

be one CLASSIFIER actress gladly PARTICLE participate in the CLASSIFIER variety program and to the audience show a nice side

'It is an actress who gladly participates in the variety program and shows the audience her nice side.'

25e. SHI yiwei nvyanyuan lixiangde LAI jieshu zhe qi zongyijiemu bingxiangguanzhou zhanshile pingyijinrendeyimian

be one CLASSIFIER actress ideally PARTICLE finish the CLASSIFIER variety program and to the audience show a nice side

'It is an actress who ideally finishes the variety program and shows the audience her nice side.'

25f. SHI yiwei nvyanyuan lixiangde LAI canyu zhe qi zongyijiemu bingxiangguanzhou zhanshile pingyijinrendeyimian

be one CLASSIFIER actress ideally PARTICLE participate in the CLASSIFIER variety program and to the audience show a nice side

'It is an actress who ideally participates in the variety program and shows the audience her nice side.'

26a. SHI Cangyue LAI jieshu zhe bu wangluoxiaoshuo jieguomeiyou shouhuo duzhedehaoping

be Cangyue PARTICLE finish the CLASSIFIER online novel and not receive readers good reviews

'It is Cangyue who finishes the online novel and does not receive good reviews from readers.'

26b. SHI Cangyue LAI zhuanxie zhe bu wangluoxiaoshuo jieguomeiyou shouhuo duzhedehaoping

be Cangyue PARTICLE write the CLASSIFIER online novel and not receive readers good reviews

'It is Cangyue who writes the online novel and does not receive good reviews from readers.'

26c. SHI Cangyue shenqinghuanghude LAI jieshu zhe bu wangluoxiaoshuo jieguomeiyou shouhuo duzhedehaoping

be Cangyue absentmindedly PARTICLE finish the CLASSIFIER online novel and not receive readers good reviews

'It is Cangyue who absentmindedly finishes the online novel and does not receive good reviews from readers.'

26d. SHI Cangyue shenqinghuanghude LAI zhuanxie zhe bu wangluoxiaoshuo jieguomeiyou shouhuo duzhedehaoping

be Cangyue absentmindedly PARTICLE write the CLASSIFIER online novel and not receive readers good reviews

'It is Cangyue who absentmindedly writes the online novel does not receive good reviews from readers.'

26e. SHI Cangyue kexide LAI jieshu zhe bu wangluoxiaoshuo jieguomeiyou shouhuo duzhedehaoping

be Cangyue unfortunately PARTICLE finish the CLASSIFIER online novel and does not receive readers good reviews

'It is Cangyue who unfortunately finishes the online novel and not receives good reviews from readers.'

26f. SHI Cangyue kexide LAI zhuanxie zhe bu wangluoxiaoshuo jieguomeiyou shouhuo duzhedehaoping

be Cangyue unfortunately PARTICLE write the CLASSIFIER online novel and not receive readers good reviews

'It is Cangyue who unfortunately writes the online novel and does not receive good reviews from readers.'

27a. SHI yiwei yingjundehuashi LAI jieshu zheyiji donghuapian jieguo yinqi fenside jidaxingqu

be one CLASSIFIER good-looking manga artist PARTICLE finish the one CLASSIFIER cartoon arouse fans great interest

'It is a good-looking manga artist who finishes the episode of a cartoon which arouses great interest from fans.'

27b. SHI yiwei yingjundehuashi LAI zhizuo zheyiji donghuapian jieguo yinqi fenside jidaxingqu

be one CLASSIFIER good-looking manga artist PARTICLE produce the one CLASSIFIER cartoon arouse fans great interest

'It is a good-looking manga artist who produces the episode of a cartoon which arouses great interest from fans.'

27c. SHI yiwei yingjundehuashi guzhijijiande LAI jieshu zheyiji donghuapian jieguo yinqi fenside jidaxingqu

be one CLASSIFIER good-looking manga artist obstinately PARTICLE finish the one CLASSIFIER cartoon arouse fans great interest

'It is a good-looking manga artist who obstinately finishes the episode of a cartoon which arouses great interest from fans.'

27d. SHI yiwei yingjundehuashi LAI zhizuo zheyiji donghuapian jieguo yinqi fenside jidaxingqu

be one CLASSIFIER good-looking manga artist guzhijijiande PARTICLE produce the one CLASSIFIER cartoon arouse fans great interest

'It is a good-looking manga artist who obstinately produces the episode of a cartoon which arouses great interest from fans.'

27e. SHI yiwei yingjundehuashi jingqide LAI jieshu zheyiji donghuapian jieguo yinqi fenside jidaxingqu

be one CLASSIFIER good-looking manga artist surprisingly PARTICLE finish the one CLASSIFIER cartoon arouse fans great interest

'It is a good-looking manga artist who surprisingly finishes the episode of a cartoon which arouses great interest from fans.'

27f. SHI yiwei yingjundehuashi jingqide LAI zhizuo zheyiji donghuapian jieguo yinqi fenside jidaxingqu

be one CLASSIFIER good-looking manga artist surprisingly PARTICLE produce the one CLASSIFIER cartoon arouse fans great interest

'It is a good-looking manga artist who surprisingly produces the episode of a cartoon which arouses great interest from fans.'

28a. SHI jingjiren LAI jieshu zhe fen yingshiheyue jieguo geiyanyuan yinlai jiufen

be agent PARTICLE finish the CLASSIFIER commercial contract and for the actor cause disputes

'It is the agent who finishes the commercial contract and causes disputes for the actor.'

28b. SHI jingjiren LAI luxing zhe fen yingshiheyue jieguo geiyanyuan yinlai jiufen

be agent PARTICLE perform the CLASSIFIER commercial contract and for the actor cause disputes

'It is the agent who performs the commercial contract and causes disputes for the actor.'

28c. SHI jingjiren wangubuhuade LAI jieshu zhe fen yingshiheyue jieguo geiyanyuan yinlai jiufen

be agent obstinately PARTICLE finish the CLASSIFIER commercial contract and for the actor cause disputes

'It is the agent who obstinately finishes the commercial contract and causes disputes for the actor.'

28d. SHI jingjiren wangubuhuade LAI luxing zhe fen yingshiheyue jieguo geiyanyuan yinlai jiufen

be agent obstinately PARTICLE perform the CLASSIFIER commercial contract and for the actor cause disputes

'It is the agent who obstinately performs the commercial contract and causes disputes for the actor.'

28e. SHI jingjiren guguaide LAI jieshu zhe fen yingshiheyue jieguo geiyanyuan yinlai jiufen

be agent weirdly PARTICLE finish the CLASSIFIER commercial contract and for the actor cause disputes

'It is the agent who weirdly finishes the commercial contract and causes disputes for the actor.'

28f. SHI jingjiren guguaide LAI luxing zhe fen yingshiheyue jieguo geiyanyuan yinlai jiufen

be agent weirdly PARTICLE perform the CLASSIFIER commercial contract and for the actor cause disputes

'It is the agent who weirdly performs the commercial contract and causes disputes for the actor.'

29a. SHI jingjiren LAI jieshu jintiande jizhehui bing geichu xiangyingde huiying

be agent PARTICLE finish today media session and accordingly respond

'It is the agent who finishes today's media session and responds accordingly.'

29b. SHI jingjiren LAI zhuchi jintiande jizhehui bing geichu xiangyingde huiying

be agent PARTICLE host today media session and accordingly respond

'It is the agent who hosts today's media session and responds accordingly.'

29c. SHI jingjiren jinzhangxixide LAI jieshu jintiande jizhehui bing geichu xiangyingde huiying

be agent PARTICLE nervously finish today media session and accordingly respond

'It is the agent who nervously finishes today's media session and responds accordingly.'

29d. SHI jingjiren jinzhangxixide LAI zhuchi jintiande jizhehui bing geichu xiangyingde huiying

be agent nervously PARTICLE host today media session and accordingly respond

'It is the agent who nervously hosts today's media session and responds accordingly.'

29e. SHI jingjiren tuodangde LAI jieshu jintiande jizhehui bing geichu xiangyingde huiying

be agent PARTICLE appropriately finish today media session and accordingly respond

'It is the agent who appropriately finishes today's media session and responds accordingly.'

29f. SHI jingjiren tuodangde LAI zhuchi jintiande jizhehui bing geichu xiangyingde huiying

be agent appropriately PARTICLE host today media session and accordingly respond

'It is the agent who appropriately hosts today's media session and responds accordingly.'

30a. SHI yiwei laoyishujia LAI jieshu jinwan yingshishengdian bingduinianqingyanyuanmen biaodazhuyuan

be one CLASSIFIER old artist PARTICLE finish tonight film festival and to young actors send best wishes

'It is an old artist who finishes tonight's film festival and sends best wishes to the young actors.'

30b. SHI yiwei laoyishujia LAI zhuchi jinwan yingshishengdian bingduinianqingyanyuanmen biaodazhuyuan

be one CLASSIFIER old artist PARTICLE host tonight film festival and to young actors sends best wishes

'It is an old artist who hosts tonight's film festival and sends best wishes to the young actors.'

30c. SHI yiwei laoyishujia naixinde LAI jieshu jinwan yingshishengdian bingduinianqingyanyuanmen biaodazhuyuan

be one CLASSIFIER old artist patiently PARTICLE finish tonight film festival and to young actors sends best wishes

'It is an old artist who patiently finishes tonight's film festival and sends best wishes to the young actors.'

36d. SHI yiwei laoyishujia naixinde LAI zhuchi jinwan yingshishengdian bingduinianqingyanyuanmen biaodazhuyuan

be one CLASSIFIER old artist patiently PARTICLE host tonight film festival and to young actors sends best wishes

'It is an old artist who patiently hosts tonight's film festival and sends best wishes to the young actors.'

36e. SHI yiwei laoyishujia nandede LAI jieshu jinwan yingshishengdian bingduinianqingyanyuanmen biaodazhuyuan

be one CLASSIFIER old artist strangely PARTICLE finish tonight film festival and to young actors sends best wishes

'It is an old artist who strangely finishes tonight's film festival and sends best wishes to the young actors.'

30f. SHI yiwei laoyishujia nandede LAI zhuchi jinwan yingshishengdian bingduinianqingyanyuanmen biaodazhuyuan

be one CLASSIFIER old artist strangely PARTICLE host tonight film festival and to young actors sends best wishes

'It is an old artist who strangely hosts tonight's film festival and sends best wishes to the young actors.'