Linguistic relativity in L2 acquisition

Chinese-English bilinguals' reading of Chinese counterfactual statements

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Proponents of the Linguistic Relativity Principle has maintained that the language we use modulates our thinking and that our thinking also shapes or determines how the language is parsed and understood. Existing research has provided compelling evidence for the above relativistic view in monolingual speakers. Recently, a growing number of studies have also started to investigate the relativistic view on language and thought in L2 learners. These L2 studies have yielded evidence regarding the cognitive constraint of an early-learned language (e.g. L1) on the later-learned language (e.g. L2). Despite this vigorous research effort, much remains unknown about whether the cognitive development in the later-learned language would modulate how the early-learned language is parsed (lower-level processing) and understood (higher-level processing). To fill the gap, this study drew on the self-paced reading experimental paradigm to study linguistic relativity effects on advanced L2 learners' reading of L1 (Chinese) counterfactual statements – a concept encoded differently in these learners' L1 and L2. The participants' online response time and offline accuracy data were both the foci of the analyses; while the analyses of the response time data were suggestive of the participants' initial lower-level parsing of the L1 counterfactual statements, the analyses of the accuracy data shed light on how the concept of counterfactuality is represented and understood in the L1. Throughout these analyses, this study intends to address the following questions: Does L2 acquisition impose any cognitive constraint on bilinguals' lower-level L1 parsing and/or on their higher-level L1 processing? If so, in what way and to what extent? Furthermore, the study also intends to empirically establish whether the cognitive constraint as stipulated by the Linguistic Relativity Principle would be modulated by different onset age of learning the L2 (early vs. late). Findings of this study are discussed vis-à-vis the Linguistic Relativity Principle, L2 processing mechanism, and L2 literacy instruction.

Keywords: L2 acquisition, linguistic relativity, counterfactuality

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1. Introduction: The linguistic relativity principle

Drawing on the self-paced reading technique, the current study aims at exploring whether proficient bilinguals' second language (L2) directs and filters their attention, *while* reading, to various first language (L1) linguistic units; and, if so, to what extent. The following paragraphs will provide the background information for the study reported in this paper.

Proponents of the Linguistic Relativity Principle believe that languages modulate the ideas of people, which, in turn, affects how they filter/parse the input information in real time and how they employ the representational cues to make sense the linguistic events in their lives (Cadierno 2010). In this vein, language cannot be separated from cognition; it guides and constrains language users' cognition; and cognition also affects how they parse and encode the language. It is important to note that languages differ from each other in terms of the surface linguistic means with which a given concept is encoded. In learning a foreign language (FL) or L2, the conceptual constraints from an early-learned language (e.g. first language, L1) would either *shape* or *determine* the later-learned language (e.g. L2 or FL). Consequently, acquiring a new language (e.g. L2) would involve (re)learning particular ways of conceptual thinking in order to parse and encode the language, which in turn would shape or determine an L2 learner's existing (L1) conceptual representations. Cross-linguistic differences in cognition thus result. The extent to which an L2 learner could successfully resolve such cross-linguistic cognitive differences would determine the ultimate attainment in the languages at their disposal. Whorf (1956: 221) has captured and described the above problem in his Principle of Linguistic Relativity (see also Bloom 1981; Liu 1985).

In reviewing recent linguistic relativity literature, Lucy (2016: 505) posits that empirical evidence has established the effects of linguistic relativity on L2 learners and that the issues at focus now are "not binary decisions about the existence or depth of linguistic relativity, but rather coherent accounts of when and how such effects operate." Lucy (2016: 508) urges the examination of linguistic relativity effects in context since some relativity effects appear verbally, others manifest only in non-verbal processing, because "some aspects of cognition may not be affected by language." In light of the selective linguistic relativity effect, instead of asking a binary inquiry on whether language influences cognition or not, researchers should investigate "which cognitive processes are affected by which linguistic categories under which circumstances" (Bylund & Athanasopoulos 2014: 953; see also Athanasopoulos & Bylund 2013); and, most importantly, to what extent.

By studying the extent to which linguistic relativity affects the development of a given language category/domain in advanced L2 learners (Han & Cadierno 2010), we are able to answer an important double-barreled inquiry concerning the

ultimate attainment of L2 acquisition: Whether L2 learners, after studying the L2 for years and/or after reaching the highest-attainable state of their L2, are able to successfully acquire a native-like L2 cognition or language system; and whether advanced L2 learners' L1 can still remain intact or native. If L1 strictly *determines* its speakers' habitual thought (the strong version of the Linguistic Relativity Principle), L1 would be less likely to be susceptible to the influence of L2 and hence remains native; however, L2, on the other hand, can never be free from the cognitive, conceptual, or processing constraints of L1 due to its dominant influence. In this regard, attaining native L2 norms would be extremely difficult, if not impossible, even for highly-proficient L2 learners. On the other hand, if L1 simply *shapes* or predisposes its speakers to particular ways of conceptualizing or processing experiences (the weak version of the Linguistic Relativity Principle), there is still a possibility for attaining native norms in some L2 linguistic domains, given enough exposure and optimal literacy experience. And L2, given sufficient development, may still stand a chance to shape some L1 domains (L1 attrition effects).

To validate the aforementioned linguistic relativity effects in the context of L2 acquisition, existing research has predominantly focused on the constraint of L1 on L2 (e.g. Ekiert 2010; Stam 2010; Athanasopoulos et al. 2011). It is important to note that for an L2 learner, the influence of language acquisition can proceed in both directions (from L1 to L2; and from L2 to L1). However, due to the skewed research effort on the linguistic relativity effect, little is known about the locus and the degree of the constraining effect of the later-learned language (L2) on the early-learned language (L1). Does L2 shape or determine L1? If so, what is the source of the constraint? Does L2 learners' deviance from L1 and L2 native norms, if any, reside at the conscious higher-level processing (e.g. making inferences) or at the subliminal lower-level processing (e.g. visual search or parsing)? Would access to the L2 at an early age (and the lack thereof) modulate the nature of the constraint? Investigations of the above questions in different L1 and L2 language domains would shed light on the input processing mechanism at work for L2 learners, which in turn would allow instructors to design effective and empirically-validated pedagogical activities for different domains (VanPatten 2004; 2008). To address the above questions, Cadierno (2010) contends that validation of the linguistic relativity principle needs to be based on experimental measures that are capable of tapping into L2 learners' *real-time* processing or thinking as they use the target language at focus.

However, existing linguistic relativity research has predominantly employed off-line (verbal) measures and focused on how the L1 affects the L2. To fill the gap, the current study aims to unveil the linguistic relativity effect by exploring how counterfactuality – a concept encoded differently in different languages – is processed and understood in real-time by advanced Chinese learners of English while

reading L1 counterfactuality statements. Tapping into these advanced L2 learners' real-time parsing and comprehension of L1 Chinese counterfactuality statements, this study aims to address two issues: (1) whether the constraint as stipulated by the linguistic relativity principle would exert any impact on advanced L2 learners' L1 reading behaviors; and if so, what the source/locus of the constraint could be and to what its extent is; and (2) whether the age of learning the L2 (early vs. late L2 learning) – a critical demographic variable determining L2 ultimate attainment – would modulate the observed linguistic relativity effect. Based on the findings of the above two issues, L2 learners' processing mechanism and pedagogical implications will be discussed.

2. Literature review: Issues in existing linguistic relativity literature

While relevant research on linguistic relativity is still scarce until the '90s, we have witnessed a growing body of relevant research during the past two decades. Despite recent active research effort in the linguistic relativity research, researchers are still debating whether the interface between language and cognition should be explored using advanced L2 learners whose L2 has probably reached the best attainable state or those whose L2 is still in progress (see Han & Cadierno 2010). Additionally, researchers have not yet agreed on whether the linguistic relativity principle should be best verified using verbal or nonverbal evidence (see Lucy 2016). The above debates are further exacerbated by the focus of existing research, which is generally biased toward testing how L1 affects L2 (e.g. Ekiert 2010; Han 2010; Stam 2010), rather than how L2 modulates L1. Due to the above methodological issues, affirmative evidence concerning the extent to which interlingual differences in cognition modulate a bilingual's L1 and L2 is still unavailable.

Based on the findings of recent linguistic and acquisition studies, this paper argues that four issues need to be addressed in the research on linguistic relativity: (1) the requisite to research linguistic relativity using L2 advanced learners; (2) the necessity to examine the influence of a late-learned language (L2) on an early-learned language (L1); (3) the need to validate linguistic relativity using nonverbal evidence; and (4) the need to pinpoint the source of constraint postulated by the linguistic relativity principle (see subsections § 2.1, § 2.2, § 2.3, and § 2.4 for more detail). To this end, this study recruited *highly*-proficient Chinese learners of English and used self-paced reading as a non-verbal measure to tap into how their L2 affects their reading of L1 (Chinese) counterfactual statements. Examinations of these highly-proficient bilinguals' online nonverbal (L1) reading behaviors allow us to explore whether the L2 modulates L1 cognition at the level of lower-level parsing or higher-level processing (Bylund & Athanasopoulos 2014). Cadierno (2010: 1)

contends that the linguistic relativity principle is concerned with "the influence the language on the kind of thinking that goes on, *online*, while we are using the language" [emphasis added]. Cadierno's contention thus suggests that the linguistic relativity principle should be best explored using nonverbal measures (e.g. eye tracking, self-paced reading) that are capable of capturing real-time (or online) language processing. To contextualize the context of the study, the four unresolved issues in existing linguistic relativity research will be elaborated in more detail in the ensuing subsections (§ 2.1–2.4).

2.1 Research linguistic relativity using advanced L2 learners

To date, much research till now has involved the linguistic relativity principle using monolingual speakers (e.g. Casasanto et al. 2004; Dolscheid et al. 2013). Casasanto et al. (2004), for instance, compared two L1 monolingual groups which differed in their spatiotemporal concepts. The first group consisted of Spanish and Greek monolinguals who perceived duration primarily in terms of quantity (e.g. 'much' time), and the second group comprised of Indonesian and English speakers who perceived duration mainly in terms of distance (e.g. 'long' time). When the second group members were asked to perceive two animated lines that were of the same duration but spanned over the computer screen with different distances (short and long), they tended to perceive the lines that seemed to span longer as having a longer time duration. On the other hand, when the researchers asked the first group members, which perceived duration in terms of quantity, to view animated filling containers, their judgments of time duration were heavily influenced by the perceived quantity of water with which the containers were filled. Full containers were regarded as having longer duration than half-full ones (even when in fact the volume of water in the two containers was the same) – a pattern not seen in the second group (English and Indonesian speakers). Whether Casasanto et al. (2004)'s observation would hold true for the L2 learners, whose interlanguage system is constantly open to the influence of their L1 and L2, and whether such spatiotemporal preference would change as a function of advances in L2 proficiency are yet to be validated in research using L2 learners.

Indeed, the basic theoretical tenet of the linguistic relativity principle does not only deal with the operation/functioning of monolingual speakers. Rather, the principle attempts to raise important questions regarding the interface of language and cognition in the minds of L2 learners. Specifically, proponents of the linguistic relativity principle maintain that learning an L2 goes beyond mastering the formal linguistic properties of a new language; the success of L2 acquisition depends greatly on the extent to which L2 learners can recalibrate their cognitive predilections in different language domains. Thus, examinations of the linguistic relativity

principle using speakers of more than one language (i.e. bilinguals) would illuminate the cognitive and linguistic blueprint of L2 learners' minds. In this vein, Han & Cadierno (2010) posit that to establish the linguistic relativity principle as a contending explanatory account for various SLA conundrums, it is imperative to draw on advanced L2 learners (whose L2 presumably has reached the highest attainable state) *and* to tease out the influence of potentially confounding factors such as L2 learner proficiency and onset age of learning the L2 (early vs. late). Studies using advanced L2 learners of different onset learning ages (early vs. late) will help address two important issues of the linguistic relativity principle: (1) whether bilinguals, after studying the L2 for many years, are able to successfully acquire a native[1] or native-like L2 system; and (2) whether L2 learners, irrespective of their onset age of learning the L2 (early vs. late), are able to be free from the cognitive constraints imposed by a language learned earlier after reaching the highest attainable proficiency state in the L2.

However, it is important to note the existing research that indeed involves L2 learners is predominantly based on bilinguals whose L2 is still *in development* (e.g. Athanasopoulos et al. 2011), and consequently, has not systematically investigated whether the recalcitrant L1 influence could be mitigated by learners' increasing control of the L2 and advance in L2 proficiency. Accordingly, it is not known if effects of linguistic relativity are indeed due to the constraint from an early-learned language (linguistic relativity effects) or are merely an artifact of inadequate command or exposure of the target language in question due to proficiency factors. Without studying the most advanced L2 users – a term coined by Cook (1999) to refer to *proficient* L2 learners' whose L2 has reached the highest attainable state – it is impossible to tease out the influence of the aforementioned confounding factors in investigations of the linguistic relativity principle. Athanasopoulos et al. (2011)'s study is a case in point. In their study, they found that Japanese learners of English shifted away from their L1 cognition (i.e. color determination parameters) toward L2 with increasing L2 proficiency. Given the dynamic and developmental nature of the cognition of L2 learners whose L2 is still in progress, it is imperative to draw on evidence from highly advanced L2 users.

Similarly, without studying early versus late advanced L2 learners, it is not known if effects of linguistic relativity would be modulated by the age of learning the L2 (early vs. late), a major demographic factor often associated with L2 ultimate attainment (see Liu 2009). Accordingly, a new line of inquiry on proficient

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1. Following the convention in several language acquisition studies (see Franceschina 2005; Socarrás 2011), this paper uses the term "native" to refer to the standard norms obtained from *monolinguals* of a given language. Any deviation from monolingual norms is considered "non-native."

L2 learners of different onset ages of learning is called for to disentangle the effects of language exposure/proficiency and age of learning the L2 from the linguistic relativity effect.

2.2 Examine the influence of a late-learned language (L2) on an early-learned language (L1)

In addition to the linguistic profile issue noted above, existing research on linguistic relativity has focused primarily on the influence of bilingual speakers' L1 on their L2 development. A substantial amount of empirical ink has been expended investigating how L1 affects L2 cognition in various domains, including speaking (Stam 2010), writing (Ekiert 2010; Han 2010), lexical use (Stringer 2010), spontaneous language use and gesturing system (Kellerman & van Hoof 2003). Overall, the results of these studies have yielded findings suggesting that cross-linguistic differences in cognition inevitably modulate the interlanguage restructuring in various aspects of L2 acquisition; some traces of L1 parsing and thinking were still observed even in highly proficient L2 learners' L2 input processing. Differential successes and failures are observed in different domains of L2 acquisition.

It is important to note the basic theoretical tenet of the linguistic relativity principle concerns *cross-linguistic* differences; "*cross-linguistic* differences in the semantic partitioning of reality give rise to *cross-linguistic* differences in cognition" (Bylund & Athanasopoulos 2014: 953; emphasis added). The keyword, cross-linguistic, in the above quote neatly underscores the core of the theoretical tenet of the linguistic relativity principle: linguistic relativity effects on cognition can proceed in *two* directions (L1→L2 vs. L2→L1), thereby leading to possible deviations from the monolingual norms of both languages. If the linguistic relativity principle is to be used as an explanatory account of L2 acquisition, a depiction of bi-directional cross-linguistic effect on the bilinguals' L1 and L2 is warranted. The field of L2 acquisition has seen some work examining the linguistic relativity principle regarding the influence of the bilinguals' L1 on their L2. Much remains unknown about the influence of the bilinguals' L2 on their L1.

2.3 Validate linguistic relativity using nonverbal evidence

The third issue in the linguistic relativity research is concerned with the fact that methodologically-appropriate research is, as noted by Han & Cadierno (2010: xv), "piecemeal and incongruent." Because the linguistic relativity principle deals with "malleability of human cognition … and the possible role the linguistic categories play in shaping specific [*underlying*] cognitive processes," the focus of the

linguistic relativity principle is on nonverbal language behavior and nonverbal cognitive mechanism. Nonverbal evidence, according to Bylund & Athanasopoulos (2014: 955), needs to be collected through tasks that do not "involve overt production or comprehension of speech." Inferences based on verbal behavioral data (e.g. story narrations or retellings) are often associated or entangled with factors other than nonverbal cognition (e.g. stiff articulatory muscle movement); consequently the constraints underlying the verbal behavioral data may not be the same as that underscoring the nonverbal behavioral data. This view is empirically established by Papafragou et al. (2008)'s study. Drawing on the eye-tracking technology, Papafragou et al. (2008) found that interlingual differences in cognition indeed influenced how L2 learners deployed their attention in lower-level parsing; but such cross-linguistic parsing differences only came into play in verbal tasks that required overt use of linguistic forms (e.g. verbal description task), but not in nonverbal tasks that did not require overt verbal communication (e.g. committing facts to memory). In this regard, differences in non-verbal cognition – the focus of linguistic relativity inquiries – should be validated only with *nonverbal* evidence, such as co-speech gesture (Núñez & Sweetser 2006), eye-movement (Papafragou et al. 2008), and parsing or encoding of a language-specific concept/event (e.g. Papafragou et al. 2008; Bylund & Athanasopoulos 2014; Schotter et al. 2014).

However, the debate on linguistic relativity was generally uninformed by empirical evidence (Bylund & Athanasopoulos 2014); and even if they do, most studies have attempted to draw on *verbal* evidence to account for differences in *nonverbal* cognition and thus present invalid evidence for the study of the linguistic relativity principle (Pinker 2007). Consequently, much remains unknown about the extent and nature of the effects of the cognitive constraint outside of overt verbalization. More systematic research using nonverbal evidence is warranted.

2.4 Pinpoint the source of constraint postulated by the linguistic relativity principle

Recent theories (e.g. Sorace 2005; Chamorro et al. 2015) have proposed that the source of constraint in a bilingual's language development may manifest either at the level of non-native representational knowledge involved in higher-level thinking processes or at the lower-level of processing/parsing difficulties. In this vein, Bylund & Athanasopoulos (2014) posit that research on linguistic relativity should simultaneously tap into two major facets: (a) conscious higher-level processing such as higher-order reasoning, inferencing, and understanding of spatiotemporal metaphors or the subjunctive mood; and (b) subliminal lower-level processing/parsing, such as visual search or sentence parsing. While the former facet sheds light on

how knowledge is represented or conceptualized in the bilingual minds, the latter facet illuminates how such representational knowledge is parsed/processed online. Insights into the aforementioned two facets are both essential in understanding the linguistic relativity effects on the functioning of the bilingual minds.

Using behavioral experiments to tap into L2 learners' conscious higher-level processing, Bylund et al. (2013) asked isiXhosa and Afrikaans speakers to pair one out of two motion event video clips with another (target) video clip on the basis of similarity in 'goal orientation.' An example of a video clip with a clear goal orientation would be an entity (e.g. car) moving along a trajectory with a clear destination. The researchers found that these speakers' object categorization preferences in the video paring task changed as a result of learning a language (i.e. English); Afrikaans and isiXhosa speakers who were more advanced and experienced in English tended to pair video clips with low goal orientation. However, such an observation was only seen in English monolinguals, but not in isiXhosa and Afrikaans monolinguals. The finding of this study thus lends support to the view that L2 learners' conscious higher-level processing may change as a function of increasing proficiency in the L2.

This view that language experience can shape L2 learners' cognition is also replicated in other studies using more sensitive research tools that are capable of tapping into initial (pre-attentive) lower-level processing (e.g. neurolinguistic technology). For instance, Boutonnet et al. (2012) used event-related potential (ERP) technology to tap into lower-level processing and found that Spanish-English bilinguals behaved like Spanish monolinguals and still voluntarily activated grammatical category of gender (masculine or feminine) – a morphosyntactic phenomenon in Spanish nouns – when viewing picture triplets consisted of nouns having the same gender and not having the same gender; but this ERP finding was not observed in English monolinguals who had no contact with Spanish. Note that these bilinguals were still not true balanced-bilinguals, as gleaned from their self-rating data. It is possible that given more exposure and experience in the L2 (English), these Spanish-English bilinguals' lower-level processing may come close to that of English monolinguals.

Although some recent studies have drawn on non-verbal evidence (picture elicitation) to establish linguistic relativity effects, they have predominantly focused on either the conscious higher-level processing (e.g. Cook et al. 2006; Bylund & Athanasopoulos 2014) or subliminal lower-level processing (Papafragou et al. 2008; Boutonnet et al. 2012). Consequently, research on linguistic relativity using non-verbal evidence has not systematically established the source or locus of cognitive constraint, namely, whether the conceptual constraint imposed by a (previously) learned language has a far-reaching impact on both the higher-level and, lower-level processing, or whether the constraint has a selective impact only on one of the two types of processing.

To date, only a few studies (e.g. Thierry et al. 2009; Chamorro et al. 2015) have attempted to address the source of constraint issue by tapping into both the lower-level parsing and the representational knowledge involved in conscious higher-level processing. Drawing upon the ERP technology, Thierry et al. (2009) explored whether native (L1) language affects cognition and perception of the world. To this end, they recruited native speakers of Greek and native speakers of English. Native speakers of Greek draw a distinction between a light and a dark shade of blue (*ghalazio* for light blue; *ble* for dark blue); but such a distinction does not exist in English. Thierry et al. (2009) asked the participants to perform an oddball detection task. In this task, these participants were required to press a button when and only when they detected a square shape within an evenly distributed stream of circles (There was a 70% chance to press the button). While some contained circles which varied in terms of colors (e.g. green + blue), others contained circles of the same color but varied from each other in terms of luminance (e.g. light/dark blue). The participants were not explicitly told about the aforementioned color or luminance differences because such information was not the requisite for performing the oddball detection task. The researchers found that color mismatch consistently elicited visual mismatch negativity (VMMN) – a reflection of low-level, pre-attentive brain activity – in native speakers of English; but a greater VMMN effect was observed for the blue luminance deviants than for the green luminance deviants in the Greek participants. In light of the above finding, Thierry et al. (2009) argue that the language we speak constrains our cognition and thought, and that such a constraint can occur as early as 100 ms – the temporal locus of preattentive lower level processing – and can continue to shape the post-perceptual, conscious, higher-level processing. Despite the above insight, Thierry et al. (2009)'s study only focuses on monolingual speakers and therefore does not shed light on the source of constraint issue in L2 learners.

Hitherto, studies that explore the source of constraint issue using L2 learners are sparse: Athanasopoulos et al. (2010) and Chamorro et al. (2015) are cases in point. Both studies indicate that the source of a bilingual's cognitive constraint (lower-level parsing vs. higher-level processing) can change as a result of having more exposure to the L2. To begin with, Athanasopoulos et al. (2010) is a continuous line of research based on Thierry et al. (2009)'s study reviewed above. Using neurophysiological evidence, Athanasopoulos et al. (2010) observed that Greek speakers' (pre-attentive) color sensitivity gradually diminished with increasing exposure to the L2 (English). In particular, Greek learners of English with longer English learning experience (1.5 years of immersion) became less sensitive to differences in blue luminance – a feature strongly evidenced in Greek monolinguals – than their counterparts with shorter English learning experience. Athanasopoulos et al. (2010) therefore concluded that the constraints on lower-level processing can

be modulated by L2 proficiency. It is important to note that Thierry et al. (2009) investigated the source of constraint issue using L2 learners whose L2 was still in progress. Their finding regarding the source of constraint therefore does not speak to advanced L2 learners whose L2 has reached the best attainable state. Accordingly, the findings of these recent neurolinguistic studies speak to the need of using advanced L2 learners (whose L2 has probably reached the best attainable state) in pinpointing the source of cognitive constraint on language use and in exploring the interface between language and cognition in the context of L2 acquisition (Han & Cadierno 2010).

Using a different type of non-verbal research protocol, i.e. eye-tracking, Chamorro et al. (2015) found out that *advanced* L2 learners did not differ from their L1 (Spanish) monolingual counterparts in terms of higher-level representational knowledge when reading L1 text (as revealed from an off-line judgment task); their source of constraint was mainly attributed to lower-level parsing (as gleaned from their eye tracking data). Interestingly, the difference in lower-level parsing between the L2 learners and L1 monolinguals was significantly reduced after the L2 learners (who predominantly used the L2 in their life and for work before the onset of the study) were intensively re-exposed to their L1 for one week. As a result of this intensive exposure, these L2 learners and the L1 monolinguals did not show significant difference in lower-level parsing. Because of this finding, Chamorro et al. (2015) maintained that lower-level parsing or higher-level representational difference resulting from cross-linguistic cognitive constraint will not be permanent and can be modulated through sufficient and intensive exposure to the target language input. Note that the 'monolinguals' in this study still had some L2 knowledge due to the national obligatory education policy in Spain and hence were not pure monolinguals. More research is warranted to establish the finding in Chamorro et al. (2015).

3. Target structure: Counterfactual construction

Counterfactual conditional (a.k.a. subjunctive) construction reflects human beings' ability to make inferences on unknown, untrue, or imaginary conditions based on available facts or information. However, speakers of different languages use different ways to encode and decode counterfactual concepts. In English, the counterfactual construction is often embedded in the *if-then* clause, where the *if*-clause states the condition of reasoning and the *then*-clause infers possible consequences providing that the antecedent *if*-clause *were* true (although it is *not* true). Note that the interpretation of the truth-value or the subjunctive mood of an English counterfactual statement relies heavily on the decoding of the following three

morphosyntactic features of the verb phrases in the *if-then* clauses: (1) past tense, (2) the perfect aspect form, and (3) modals such as *might, would, could*. Thus, to successfully infer the subjunctive mood of the following (English) counterfactual statement, the reader needs to attend to all three of the above-mentioned morphosyntactic features: *If I had been at YoYo Ma's concert yesterday, I would have asked for Ma's autograph*. This encoding feature of the English counterfactual construction is consistent with findings from existing language processing research; namely, monolingual native English speakers depend predominantly on morphosyntactic cues (e.g. Subject-Verb-Object word order, *if-then* sentence frame, and verb inflection) to infer the subjunctive mood in English.

In contrast, monolingual native Chinese speakers do not simply depend on morphosyntactic cues in interpreting the subjunctive mood. The morphosyntactic cues, such as the *if-then* (*ruguo…dehua*) sentence frames, are optional, rather than obligatory, markers in expressing counterfactuality in Chinese; the morphosyntactic markers, *ruguo* (a sentence-initial marker similar to English *if*) and *dehua* (a sentence-medial marker for the *if-then* sentences in the Chinese counterfactual conditionals) can be optionally omitted, leading to four sentence possibilities (see Examples (1a–1d) in Table 1 below). In Example (1a), both morphosyntactic markers are present. In Examples (1b), only the sentence-initial marker *ruguo* is present. In Example (1c), only the sentence-medial marker, *dehua,* is present. In Example (1d), both markers are omitted.

Table 1. Morphosyntactic means to encode Chinese counterfactual conditionals

Morphosyntactic means	Example (1)		
		a.	***Ruguo*** *wo shi ni* ***dehua****, wo jiu fangqi.* 如果我是你的話，我就放棄。 If I am you, I would then give up. "If I were you, I would have given up."
		b.	***Ruguo*** *wo shi ni, wo jiu fangqi.* 如果我是你_____，我就放棄。
		c.	*Wo shi ni* ***dehua****, wo jiu fangqi.* _____我是你的話，我就放棄。
		d.	*Wo shi ni, wo jiu fangqi.* _____我是你 _____，我就放棄。

Nevertheless, when reading 1a-, 1b-, 1c-, and 1d-based sentences, native Chinese readers would unambiguously perceive these four statements as counterfactual, rather than regular, conditional statements, knowing that the writers of these statements can *never* be them (the readers). In other words, contextual cues turn these (1a-, 1b-, 1c-, and 1d-based) sentences into counterfactual statements and outweigh the role of morphosyntactic cues. For instance, even without the two morphosyntactic markers (*ruguo* and *dehua*), Example (1d) *can* still constitute a legal Chinese

counterfactual statement, because of the contextual and background information shared by the readers. To further illustrate this point, let us take the following sentence as an instance: *Ruguo ni sandian zhong zhiqian guolai dehua*, *women keyi yiqi he xiawucha*. (Lit., "If you come before 3 pm, we can have afternoon tea together.") This sentence has a structure similar to Example (1a). This conditional statement can potentially serve as a counterfactual statement if the sentence was written at, say, 5 pm that day. Another example is: 如果港澳之間有大橋連接… ("If there *was* a bridge connecting Hong Kong and Macau, …"). This Chinese example sentence can be considered as a counterfactual statement if the readers share the background information that there is no bridge connecting the two places. The above examples collectively suggest that although interpretation of Chinese counterfactuals relies on linguistic information at all levels, morphosyntactic cues play a relatively less important (i.e. optional) role for interpreting Chinese subjunctive mood, compared with other contextual cues (Liu et al. 1992; Chou 2000).

3.1 Reading of Chinese counterfactual sentences by Chinese learners of English

Based on the above discussion, the following paragraphs will propose the working hypotheses for Chinese-English bilinguals' reading of L1 (Chinese) counterfactual sentences vis-à-vis the two possible constraint loci put forward by Bylund & Athanasopoulos (2014): (a) subliminal lower-level processing; and (b) conscious higher-level processing.

To test if the participants' lower-level processing of L1 counterfactual sentences is constrained by their L2 lower-level parsing experience, this study analyzed the participants' processing behaviors in reading 1a- and 1c-based sentences (which both contain the sentence-medial morphosyntactic marker, *dehua*); in particular, this study explored whether the participants' low-level processing time of the sentence-medial morphosyntactic marker, *dehua,* in a counterfactual statement would be significantly shortened by whether the statement was fronted with the sentence-initial morphosyntactic marker, *ruguo* (1a- vs. 1c-based sentences). The underlying rationale is stated below. Cognitive research has shown that bilinguals – irrespective of their language backgrounds – tend to notice the sentence-initial forms (e.g. *ruguo*) than the sentence-medial ones (e.g. *dehua*) in initial subliminal lower-level processing (VanPatten 2004; 2008). In this regard, it is difficult for bilinguals to miss out on the sentence-initial marker, *ruguo,* in their lower-level processes. On the other hand, sentence-medial marker *dehua* does not necessarily invite readers' attention unless their lower-level processing parsers are indeed sensitive to morphosyntactic cues. Cross-comparisons of the processing time data for 1a- and 1c-based sentences would therefore provide an optimal testing ground

for the readers' subliminal lower-level processing predilection toward the morphosyntactic cues (*dehua*).

Specifically, if the idiosyncratic formal features in the L1 strictly *determine* how the L2 input may be parsed during initial lower-level processing, cross-linguistic (L2→L1) influence or permeability would not be possible. In this regard, L2 experience would have limited impact on the L2 learners' L1 lower-level processing or parsing. In this case, proficient Chinese learners of English may probably still parse Chinese (L1) counterfactual statements in the native (Chinese) manner. Accordingly, Chinese learners of English reading Chinese counterfactuals would *not* exclusively draw on morphosyntactic cues (like English monolinguals); instead, they would heavily draw on *all* available cues, including lexical, morphosyntactic, discourse, and other background information cues, in inferring the subjunctive mood (a processing strategy seen in Chinese monolinguals). In this case, the morphosyntactic marker *dehua* in sentences like Examples (1a) and (1c) may become functionally redundant due to concurrent availability of other useful cues; consequently, the processing times for *dehua* in 1a- and 1c-based sentences may not significantly differ from each other (see Table 2 below).

Table 2. Possible response times (RT) scenarios for native vs. non-native lower-level processing

	Ruguo…dehua		***…dehua***
Native mode	1a-based sentences ^{RT}	=	1c-based sentences ^{RT}
Non-native mode	1a-based sentences ^{RT}	<	1c-based sentences ^{RT}

However, if the L1 only *shapes*, but not determines, how the L2 may be processed, L2 parsing would not be completely dictated by L1 parsing. In this case, due to cross-linguistic influence or permeability, extensive L2 (English) experience may still stand a chance to modulate advanced bilinguals' L1 lower-level parsing. In this case, proficient Chinese learners of English may be more sensitive to available morphosyntactic cues (*ruguo…dehua*) than their Chinese monolingual counterparts and hence parse the L1 counterfactual statements with a heavier reliance on morphosyntactic cues; advanced L2 learners' L1 parsing therefore may be 'non-native.' Despite their heavier reliance on morphosyntactic cues, advanced L2 learners' attention to the sentence-medial morphosyntactic marker *dehua* in 1a- and 1c-based sentences may vary. Specifically, in 1a-based sentences, sentence-initial marker *ruguo* (similar to English *if*) would provide an earlier and more explicit constraint on the learners' parsing, thereby turning *dehua* into a functionally redundant counterfactual marker. In this case, parsing of *dehua* would require little mental effort and limited processing time for readers who depends heavily on morphosyntactic

cues in initial lower-level parsing. In contrast, in 1c-based sentences, due to the absence of sentence-initial marker *ruguo, dehua* would become a more prominent conditional or counterfactual marker in comparison with its role in 1a-based sentences. In this regard, parsing of *dehua* would require more mental effort and longer processing time for readers who depend heavily on morphosyntactic cues in initial lower-level parsing.[2] Accordingly, the processing time for *dehua* in 1c-based sentences would be longer than the one in 1a-based sentences (see Table 2).

Up next, to test if the participants' L1 higher-level processing of L1 counterfactual sentences is constrained by how the concept of counterfactuality is represented in the L2, this study explored whether their correct understanding of such sentences would be affected by the number of morphosyntactic cues in the sentences. Specifically, if the L1 (e.g. Chinese) strictly *determines* how the L2 (e.g. English) would be represented and understood, L2 experience would have very limited impact on their entrenched L1 higher-level conceptual representational system; and in this regard, counterfactual concepts would still be represented and understood in the native L1 (Chinese) mode. In this case, morphosyntactic cues such as *ruguo* and *dehua* would not be the most dominant representational cue activated in interpreting an L1 (Chinese) subjunctive statement; instead, advanced Chinese-English bilinguals, like Chinese monolinguals, would draw on all available representational cues to infer the subjunctive mood of a statement. In this situation, the number of morphosyntactic markers – the representational cues relied heavily by English monolinguals – should not significantly affect Chinese-English bilinguals' correct identification and understanding of the subjunctive mood. This suggests that readers should have comparable accuracy rates in interpreting the subjunctive mood in reading examples 1a-based sentences (two-marker), 1b-based sentences (one-marker), 1c-based sentences (one-marker), and 1d-based sentences (zero-marker) (see Table 3 below).

In contrast, if the L1 *shapes*, rather than determines, the L2, increasing L2 experience would allow bidirectional permeability of mental higher-level representations between the L1 and L2 (L1→L2; and L2→L1). In this case, proficient L2 (English) learners' extensive L2 experience would shape their L1 (Chinese) cognition, and their counterfactual concepts would thus be gradually represented in the non-native Chinese manner as their L2 system develops; morphosyntactic representational cues would increasingly receive more weight and play a more important role in representing this concept. In this regard, the number of available

2. According to VanPatten (2004), functors that are attended to in input processing (*dehua* in 1c-based sentences) would lead to longer processing times than the unattended or lesser attended ones (*dehua* in 1a-based sentences).

morphosyntactic markers in a counterfactual statement would significantly affect the correct identification and understanding of the subjunctive mood of a counterfactual statement. In this case, it is conceivable that Chinese learners of English would have the highest accuracy rates in understanding 1a-based sentences (two markers), followed by 1b-based sentences (one marker), 1c-based sentences (one marker) and 1d-based sentences (no marker). Note, however, that although 1b-based sentences and 1c-based sentences both contain one morphosyntactic marker, the accuracy rates in reading 1b-based sentences (*ruguo…*) should be higher than in reading 1c-based sentences (*…dehua*) because the sentence-initial marker *ruguo* ('if') in 1b-based sentences provides an earlier and more explicit constraint on the readers' higher-order thinking and comprehension of the content of the sentence in question (see Table 3).

Table 3. Possible accuracy rates (AR) for native vs. non-native higher-level processing

	2 markers		**1 marker**		**1 marker**		**0 marker**
Native mode	1a-based sentences ^{AR}	=	1b-based sentences ^{AR}	=	1c-based sentences ^{AR}	=	1d-based sentences ^{AR}
Non-native mode	1a-based sentences ^{AR}	>	1b-based sentences ^{AR}	>	1c-based sentences ^{AR}	>	1d-based sentences ^{AR}

4. Research questions

Tapping into advanced L2 learners' lower- and higher-level processing of L1 counterfactuality statements, the current study explores the following two questions:

(1) Are proficient Chinese learners of English able to use the native L1 (Chinese) mode when reading and comprehending L1 counterfactual statements? If not, how do they differ from L1 Chinese monolinguals? Do they differ from L1 monolinguals in terms of lower-level, higher-level processing, or both?
(2) Would the onset age of learning the L2 (early vs. late) make any difference to proficient L2 learners' reading and understanding of L1 counterfactual statements?

5. The study

5.1 Participants

Sixty-five people participated in the study, including 55 highly proficient Chinese learners of English serving as the focus group (mean age: 21.4 years) and 10 Chinese monolingual serving as the comparison baseline.

Regarding the Chinese learners of English, the researcher followed Silverberg & Samuel (2004) and divided these L2 learners into (1) early proficient learners ($N = 23$) – those who learned the L2 (English) before the age of seven – and (2) late proficient learners ($N = 22$) – those who learned the L2 after the age of seven. All of these L2 learners' English proficiency levels in all four language skills were considered near-native (C2 CEFR-level) as attested to by their scores in standardized English proficiency tests (e.g. TOEFL, IELTS, and TOEIC). On average, the L2 learners had learned English for 13.8 years at the onset of this study, and all considered themselves as having near-native English reading proficiency in a self-assessment survey. They all reported using English for professional and social purposes on a daily basis. They were all highly motivated to continue polishing their English language skills, and considered having a native or native-like reading skill as a persisting goal.

In addition to these proficient L2 learners, the researcher also recruited ten first-year military preparatory school students whose data served as the comparison baseline (mean age: 15.2 years). These military school students did not have any formal or informal English (or other foreign language) learning experience during their elementary school education and joined a military preparatory school for their secondary school education. The study took place during the first two months of their military preparatory school education; as a result, these students had very limited (near zero) exposure to English. When asked to self-assess the proficiency of their four language skills in English on a five-point Likert scale (1 being true beginner; 5 being completely native), none of these military school students even considered themselves as having beginning proficiency in any language skill (a self-assessment score of 1). Given the background information above, the performance data of these military students sufficed to provide Chinese monolingual baseline data.

5.2 Design and materials

For the purpose of the study, a contextualized passage, which comprised of 900 Chinese characters, was constructed; the passage was a college student's reflection on her previous academic life (see the appendix). Sixteen counterfactual statements,

built on the example sentences from the four Chinese morphosyntax-based counterfactual possibilities listed in Table 1 (i.e. Examples (1a–1d)), were embedded in the passage, with four token sentences for each possibility (see the appendix). This yields four 1a-based sentences, four 1b-based sentences, four 1c-based sentences, and four 1d-based sentences.

As noted earlier, 1a-based sentences contain two morphosyntactic markers, 1b- and 1c-based sentences encompass 1 morphosyntactic marker, and 1d-based sentences do not include any morphosyntactic marker. These four types of sentences thus provide a testing ground for the role of morphosyntactic cues in the participants' representational knowledge involved in conscious higher-level processing. Among the four types of sentences, 1a- and 1c-based sentences provide a testing ground for participants' sensitivity toward the (less-salient) sentence-medial morphosyntactic marker (*dehua*) in subliminal lower-level processing. Based on the early discussion of native and non-native lower-level and higher-level processing (see Tables 2 and 3 for the summary), the present study explored:

(1) The processing time data of *dehua* in counterfactual statements with *ruguo* (e.g. 1a-based sentences) and without *ruguo* (e.g. 1c-based sentences); and
(2) The accuracy data in inferring the subjunctive mood in these sixteen (1a-, 1b-, 1c-, and 1d-based) counterfactual sentences.

While the analyses of the processing time data were suggestive of the participants' initial lower-level parsing predilection, the analyses of their accuracy data in inferring the subjunctive mood would allow us to infer how higher-order knowledge of counterfactuality is encoded, represented, and understood in the minds of the participants. The ensuing paragraphs will detail the protocols/instruments through which the processing data and accuracy data were obtained.

To obtain the participants' processing time data (measured in milliseconds in the current study), the present study drew on the self-paced reading task – an online reading protocol used extensively in (L2) lexical and sentence processing studies – to tap into their real-time lower-level parsing behaviors in a contextualized reading task. In a self-paced reading task, the text was serially – from left to right – presented to the participants on a computer screen. The participants initiated the reading task by pressing the keyboard spacebar. This action brought up the first character. After viewing the presented lexical character, the participants pressed the spacebar again to request the following character; previously read characters remained on the screen as new characters were presented. The participants continued the above routine until they finished reading this passage. In a self-paced reading task, the response time in requesting each lexical or functional word is recorded by the computer; the elapsed time between the onset of

two successive presses reflects the processing time of a given content (e.g. lexical) or functional (e.g. grammatical) unit; researchers are usually interested in exploring the time required to read a particular content or function unit at focus compared to a control or comparison condition (e.g. the processing time of *dehua* in Examples (1a) and (1c), with and without sentence-initial morphosyntactic marker *ruguo*). Additionally, the elapsed time information is believed to provide a direct reflection of the readers' parsing preference or strategy of the content/functional unit at focus. Although proficiency may be a factor affecting the participants' response times, self-paced reading aims at looking at the *relative* patterns in a reader's reading behavior (e.g. having a *relatively* faster processing time of structure A under condition 1 than under condition 2). Accordingly, absolute inter-learner difference in processing times would not be an issue in the self-paced reading paradigm. In addition, in the current study, inter-learner differences in processing time is lessened to the minimum by controlling for the participants' overall proficiency (C2-level) and reading proficiency (C2-level), as attested to by their performance in a standardized proficiency test.

To obtain the accuracy data that reflects the participants' representational knowledge involved in higher-level processing, an offline reading test consisting of 23 questions were immediately administered to the participants after they finished reading the passage. Seven out of the 23 questions were filler questions; 16 questions aimed at exploring whether the participants could accurately infer the subjunctive mood of the target 16 counterfactual statements, which varied in terms of the number of morphosyntactic markers. One point was awarded for a correctly answered question; note however that only the points from the 16 counterfactual questions were counted (the maximum score for the reading test was therefore 16 points). The analysis of the processing time and accuracy data sheds light on the underlying lower-level and higher-level processing employed by proficient Chinese learners of English while reading L1 counterfactual statements.

5.3 Apparatus

A Macintosh laptop was used to run the experiment, which was administered to each participant individually in a single session. The laptop was connected to an external keyboard, which allowed the participants to respond to the presented stimuli, and to an external 20-inch computer display, which presented the stimuli in black against a white background. All the stimuli were shown on the screen in 120-point, normal (Kai) font. Presentations of the stimuli and recording of the participants' responses and accuracy data were managed by *Superlab* (v. 5.0).

6. Results

The data analysis methods were mainly based on multivariate analysis of variance (MANOVA). MANOVA was performed to explore whether there existed any performance difference between groups (e.g. advanced L2 learners vs. monolingual baseline) under different sentence pattern conditions (e.g. 1a- vs. 1c-based sentences), with response times and accuracy rates being the dependent variables; and with Group (L2 learner and monolingual control), Onset Age of Learning the L2 (early vs. late), and Sentence Pattern (e.g. 1a- vs. 1c-based sentences) being the independent variables. While exploring the effect, if any, of Sentence Pattern on the participants' performances, the MANOVA of the response time data focused only on 1a- and 1c-based sentence variants, the MANOVA of the accuracy data focused on all (1a-, 1b-, 1c-, and 1d-based) sentences.

6.1 Processing times

The MANOVA results, shown in Table 5 below, indicate that the participants' processing time of the sentence-medial morphosyntactic marker (*dehua*) was significantly affected by Group (advanced L2 learners vs. monolinguals) ($F = 43.16$, $p < .01$). Advanced L2 learners and monolinguals significantly differed from each other, both when processing the *dehua* seeded in 1a-based sentences ($F = 36.44$, $p < .01$) *and* in 1c-based sentences ($F = 28.89$, $p < .01$). Specifically, in parsing the *dehua* in 1a-based sentences, advanced L2 learners exhibited shorter response times (366 ms) than Chinese monolinguals (537 ms). Similarly, in parsing the *dehua* in 1c-based sentences, L2 learners again showed shorter responses (362 ms) than Chinese monolinguals (477 ms). Therefore, Chinese monolinguals seemed to take more time to process the Chinese counterfactual marker *dehua* than advanced L2 learners. This between-group difference (the L2 learner group having shorter response times) was observed in both sentence types (1a) and (1c).

MANOVA further showed that the Onset Age of Learning the L2 exerted a significant impact on the processing data (F=9.46, $p < .01$); early L2 learners were much faster in processing the sentence-medial morphosyntactic marker, *dehua,* than late L2 learners both in cases of 1a-based sentences ($F = 8.68$, $p < .01$), and 1c-based sentences ($F = 6.54$, $p < .05$). Accordingly, in terms of initial lower-level parsing of morphosyntactic marker (i.e. *dehua*), Chinese monolinguals required the longest time, followed by late L2 learners; overall, early L2 learners significantly spent less time than their late counterparts.

Despite the above between-group difference in parsing speed, MANOVA did not detect the main effect of Sentence Pattern. This indicated that sentence

Table 4. MANOVA results for the response time data

Group (L2 learners vs. monolinguals)	*F*	43.16
	p-value	.000*
Sentence Pattern (1a- vs. 1c-based sentences)	*F*	1.33
	p-value	.26
Onset Age of Learning the L2 (early vs. late)	*F*	9.46
	p-value	.002*
Group*Sentence Pattern	*F*	.232
	p-value	.874
Group*Onset Age of Learning the L2	*F*	.446
	p-value	.641
Sentence Pattern*Onset Age of Learning the L2	*F*	.225
	p-value	.968
Group*Sentence Pattern*Onset Age of Learning the L2	*F*	.02
	p-value	.99

pattern – whether (1a- vs. 1c-based) sentences were fronted with the sentence-initial morphosyntactic marker (*ruguo*) did *not* exert a significantly impact on each group's processing time of *dehua* – including L2 learners and monolinguals ($F = 1.33$, $p > .05$). This suggests that all the participants' parsing of *dehua* did not significantly differ, regardless of the presence of the sentence-initial morphosyntactic marker, *ruguo*. Finally, there is no interaction between Group and Sentence Pattern, nor between Sentence Pattern and Onset Age of Learning the L2. Taken together, all groups' initial lower-level parsing predilection pattern appeared the same; but they differed from each other in terms of processing speed/time.

6.2 Accuracy rate

MANOVA was also used to explore the participants' accuracy rates in performing higher-level processing of Chinese counterfactual sentences. MANOVA of the accuracy data detected the main effect of Group ($F = 25.96$, $p < .01$); the L2 learner group significantly outperformed the monolingual group. Thus, despite that observation that L2 learners generally spent less time than Chinese monolinguals in lower-level parsing (as revealed by the response time data noted earlier), they actually demonstrated a better understanding of the subjunctive mood, as gleaned from their accuracy data. Nevertheless, MANOVA did not detect the main effect of Onset Age of Learning the L2; this indicates that there was no significant difference between early and late advanced L2 learners in terms of accuracy rates. Taken

together, advanced L2 learners, irrespective of their onset age of learning the L2, seemed to better able to leverage their performance in extracting the subjunctive mood than their monolingual peers.

Importantly, unlike the analysis of the response times data that showed no main effect of Sentence Pattern, the analysis of the participants' accuracy data indicated that sentence pattern had a significant impact on their accuracy performance ($F = 14.71$, $p < .01$), suggesting that the participants' correct understanding of counterfactuality is affected by the number of morphosyntactic markers. It is worth noting that MANOVA also detected the interaction between Onset Age and Sentence Pattern ($F = 3.45$, $p < .05$). A simple main effect test was thus performed; the test indicated that effects of Sentence Pattern were mainly attributed to advanced L2 learners, rather than to Chinese monolinguals. In other words, only L2 learners' conscious higher-level processing of the (L1) subjunctive mood was affected by differences in sentence pattern; Chinese monolinguals' (correct) understanding of counterfactuality was *not* affected by differences in sentence pattern (1a) vs. (1c).

Table 5. MANOVA results for the accuracy rate data

Group (L2 learners vs. monolinguals)	*F*	25.96
	p-value	.000*
Sentence Pattern (1a-, 1b-, 1c-, 1d-based sentences)	*F*	14.71
	p-value	.000*
Onset Age of Learning the L2 (early vs. late)	*F*	.001
	p-value	.88
Group*Sentence Pattern	*F*	.11
	p-value	.90
Group*Onset Age of Learning the L2	*F*	.20
	p-value	.80
Sentence Pattern*Onset Age of Learning the L2	*F*	3.45
	p-value	.02*
Group*Sentence Pattern*Onset Age of Learning the L2	*F*	1.52
	p-value	.21

In the light of L2 learners' sensitivity to the number of available morphosyntactic markers, further post hoc tests were performed to explore whether significant accuracy differences existed between and among 1a- (*ruguo…dehua*), 1b- (*ruguo…*), 1c- (*…dehua*), and 1d-based (zero marker) sentences. The post-hoc tests detected a significant difference in accuracy rates between the two-marker (1a-based) sentences (*ruguo…dehua*) and one-marker (1c-based) sentences (*…dehua*), with the former being higher than the latter, i.e. 92 vs. 68% ($t = 2.25$, $p < .05$). Additionally,

L2 learners' accuracy rates were significantly higher reading the two-marker (1a-based) sentences (*ruguo…dehua*) than reading the zero-marker (1d-based) sentences (92 vs. 87%; $t = 2.95$, $p < .05$). Furthermore, their accuracy rates were also significantly higher reading the one-marker (1b-based) sentences (….*dehua*) than reading the zero-marker (1d-based) sentences (i.e. 90 vs. 87%; $t = 2.72$, $p < .05$). Last but not least, L2 learners exhibited better accuracy rates reading one-marker (1b-based) sentences (*ruguo*…) than reading one-marker (1c-based) sentences (…*dehua*) (90% vs. 68%; $t = 2.17$, $p < .05$), probably due to the sentence-initial marker's (*ruguo*) early constraint on the participants' understanding in 1b-based sentences. The post-hoc test results reported above generally lent support to the prominent role of morphosyntactic marker in understanding L1 counterfactual statements; namely, for L2 learners, more morphosyntactic markers led to higher accuracy rates (see Figure 1 for visual schematization of the above results).

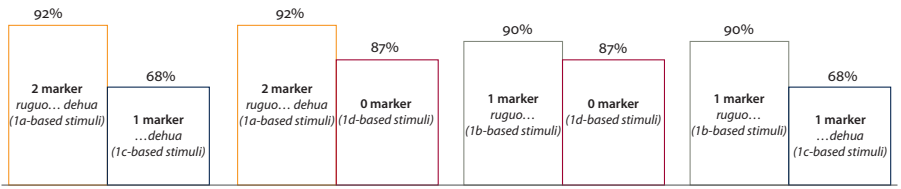

Figure 1. Visual schematization of the effect of morphosyntactic markers on L2 learners' correct understanding of L1 counterfactual statements

Note however that the statistical analysis results supporting the prominent role of morphosyntactic representational knowledge in assisting L2 learners' understanding of L1 counterfactual sentences are not unequivocal. Two problematic post-hoc test results warrant further examination and explanation. The first problematic post-hoc test result showed that L2 learners did not show significant difference in accuracy rates reading the two-marker (1a-based) sentences (*ruguo…dehua*) and reading one-marker (1b-based) sentences (*ruguo…*), i.e. 92 vs. 90% ($t = 2.33$, $p > .05$). The second problematic post-hoc test result showed that the L2 learners exhibited better accuracy rates when reading zero-marker (1d-based) sentences than when reading one-marker (1c-based) sentences (87% vs. 68%; $t = -4{,}48$, $p < .01$). These seemly inconsistent findings will be addressed and explained in further details in the Discussion Section below.

7. Discussion and conclusion

A core theoretical tenet of the linguistic relativity principle is that cognition either shapes or determines how a concept is parsed and encoded (represented) in a given language. Targeting high-proficient L2 learners, this study was set out to explore whether cross-linguistic cognitive differences in the concept of counterfactuality can be resolved by advanced L2 learners; and if not, whether and to what extent such differences would modulate how a bilingual's L1 is parsed (lower-level processing) and understood (higher-level processing). One might recall that two types of data are employed in the current study, online (real-time) response time data and offline accuracy data, with the former aiming to tap into the subliminal lower-level processing and the latter shedding light on the representational knowledge involved in conscious, higher-level processing. I shall discuss the response time and accuracy data vis-à-vis the inquiries of this study.

Are early and late proficient Chinese learners of English able to use the native (Chinese) parsing mode when processing L1 counterfactual statements?

A statistical analysis (MANOVA) of the response time data showed that the L2 learners group were consistently faster than the monolingual group in parsing the sentence-medial morphosyntactic marker (*dehua*), both in cases of 1a-based sentences (where *dehua* is fronted with *ruguo*) and 1c-based sentences (where *dehua* is the only morphosyntactic counterfactual cue). MANOVA further pointed out that among the 55 advanced L2 learners, early learners consistently outperformed the late learners in terms of parsing speed. In other words, the ranking of the processing time for the sentence-medial morphosyntactic marker (*dehua*), from the fastest to the slowest, is: early L2 learners, late L2 learners, and monolinguals. Of these three populations, early L2 learners had the longest exposure to and literacy experience with the L2, and monolinguals had the minimal (near-zero) L2 literacy experience. This entails that L2 literacy experience is probably a critical determinant for lower-level parsing; longer and more extensive L2 literacy experience appears to promote more efficient and faster lower-level parsing. This would not be surprising if we are talking about effect of L2 literacy experience on L2 parsing speed. Note that in the case of current study, L1 lower-level parsing was the focus of the examination and it seemed to be facilitated by extensive L2 literacy experience; this in turn suggests that the efficiency of lower-level parsing probably involves some language universal components that can be boosted by the literacy experience either from a bilingual's L1 or L2. This is consistent with current findings that success in L1 literacy facilitates later L2 literacy skills (Bourgoin 2014; Shum et al. 2016) and success in L2 literacy also reciprocally enhances L1 literacy skills (Hussien 2014).

Given that the development of literacy skills in a bilingual's L1 and L2 positively influences each other and that such cross-linguistic positive transfer is evidenced as early as the third grade in elementary school (Murphy et al. 2015), educators probably should refrain from perceiving early L2 literacy instruction as an obstacle to achieving greater literacy skills in the L1.

Despite the effect of Group, the MANOVA of the response time data indicated that there was no main effect of Sentence Structure, suggesting that all of the three populations' (early L2 learners, late L2 learners, and monolinguals) initial lower-level parsing predilection was not affected by the sentence structure of the counterfactual statement; specifically, the three populations' lower-level processing time of the sentence-medial morphosyntactic marker *dehua* did not differ, regardless of whether the marker was fronted with a stronger, and more salient sentence-initial morphosyntactic marker *ruguo.* We thus can infer that both the early and late L2 learners' initial lower-level parsing was *not* particularly sensitive to the available morphosyntactic markers – a scenario expected in the parsing of Chinese monolinguals.

Based on this finding, one may argue that these L2 learners, irrespective of their onset time of learning the L2, adopted a native lower-level parsing strategy analogous to the one used by their Chinese monolingual counterparts (drawing on all available cues) when reading L1 counterfactual statements. At the first glance, this appears to suggest that these L2 learners' L1 lower-level parsing still remains intact and 'native' despite their extensive L2 learning experience. And this in turn entails that L1 (Chinese) cognition *determines* how the concept of counterfactuality is parsed, such that these L2 learners' highly developed L2 (English) did not even stand a chance to modulate how the concept was parsed in their L1. But this finding – that these L2 learners' parsing remain "native" – could be examined and interpreted from a different lens if we also consider the findings from Chamorro et al. (2015) – a study reviewed earlier which also examined advanced L2 learners' L1 reading process.

As noted earlier, in Chamorro et al. (2015), two groups of advanced L2 learners were studied. One L2 learner group (L2-only group) had very limited opportunities to use the L1 prior to the study and they demonstrated qualitatively different (non-native) lower-level parsing pattern from their L1 monolingual counterparts. The other L2 learner group, which also had very similar L2 proficiency profiles, were "re-exposed" to an intensive L1 environment for one week (without any explicit instruction), thereby having recent active L1 and L2 exposure at the time of the study. Importantly, these re-exposed L2 learners showed similar (i.e. native) parsing patterns seen in their L1 monolingual counterparts – which corresponds to the finding of the current study – after experiencing input changes in their language environment. This suggests that the input stimulation in the re-exposure

group probably awoke/reactivated these L2 learners' (native) L1 parser from the dormant mode and these learners employed this optimal (L1 native) parsing mode when reading L1 stimuli. These re-exposed L2 learners are similar to the L2 learners in this study because their parsers were both being recently exposed to intensive L1 and L2 input before and during the study (rather than being exposed to an L2-exclusive input environment); their L1 and L2 parsers were thus probably both active and ready for use at their disposal. This probably allowed these re-exposed L2 learners in Chamorro et al. (2015) and the L2 learners in this study to readily switch to the optimal (native) L1 parsing predilection when reading L1 stimuli. Without sufficient L1 exposure, highly advanced L2 learners' L1 parsing probably would still be heavily influenced by their L2 parsing predilection due to their extensive L2 experience and would thus demonstrate non-optimal (non-native) L1 parsing strategy like what was seen in the other group of L2 learners (L2-only group) in Chamorro et al. (2015)'s study. However, with active and extensive L1 and L2 exposure, L2 learners are capable of switching to the optimal (either native(like) L1- or L2-based) mode, thinking and parsing the target language in accordance with their (recent) linguistic experience. In this vein, Montero-Melis et al. (2016: 636–657) notes:

> Recent linguistic experience…affect[s] what we judge…bilinguals' mental processes…switch between different conceptual representations depending on the language they are [actively] using at the time…

They further note that recent linguistic experience is central to human cognition and underlies many of the bilingual's mental operations and language use.

Accordingly, based on the analysis of the response time of this study and the findings of Chamorro et al. (2015), two important inferences can be made vis-à-vis the two research questions:

- Q1: The constraint as postulated by the Linguistic Relativity principle *may* manifest at initial lower-level parsing *when* L2 learners do *not* have active exposure to the target language (L1) input (as seen in Chamorro et al. 2015). In this case, L2 learners may show parsing predilection qualitatively different from (L1) native norms (as seen in Chamorro et al. 2015) and/or are less efficient in lower-level parsing speed (as shown by the MANOVA of this study). However, when being exposed to robust target language (either L1 or L2) input, L2 learners probably would show native(like) parsing predilection comparable to the one seen in native (L1 or L2) monolinguals. In other words, the constraint as postulated by the linguistic relativity principle is *not* present in *all cases*, at least in the case of lower-level parsing.
- Q2: The age of learning the L2 – a learner-internal variable – imposes a significant impact on L2 learners' parsing predilection (as shown by the MANOVA

of this study). Nevertheless, the learner-external variable – the amount of language input and literacy experience – seems to be capable of modulating the L2 learners' lower-level parsing predilection (as seen in Chamorro et al. 2015). External pedagogical forces (such as extensive literacy experience, active L1/L2 use) may override the constraint resulting from the learner-internal factors (i.e. differences in cognition and onset age of learning the L2), allowing L2 learners to adopt the optimal (either native(like) L1- or L2-based) parsing strategies when reading the languages at their disposal and enhancing their parsing speed.

Because the constraint resulting from the initial lower-level parsing is potentially amenable to the forces of external pedagogical treatment (e.g. extensive literacy experience, active L1/L2 use) and L2 learners' parsing mechanism is dynamic and fluid, the determinists' view (the strong version) of the Linguistic Relativity Principle does not seem to be the best account for the findings of this study and Chamorro et al. (2015). Unlike the strong version of the Linguistic Relativity Principle that stipulates that cross-linguistic differences in cognition are the primary forces determining how (L2) learners parse the languages at their disposal, the current study argues that learners' parsing is susceptible to (and can be shaped by) the influence of external pedagogical environment (as shown in Chamorro et al. 2015 and the current study). Therefore, instead of positing a definitive influence of L1 (the strong determined view of the Linguistic Relativity Principle), this paper argues that the *weak* version of the linguistic relativity principle seems to better explain the findings of the two studies. Importantly, lower-level parsing is traditionally perceived as an 'encapsulated' process that is not open to the intervention of external (pedagogical) forces. The findings of the current study and Chamorro et al. (2015) collectively suggest that pedagogical forces may have the potency of 'fine-tuning' and 'optimizing' L2 learners' lower-level parsing and that L2 learners are capable of adopting optimal (native) parsing strategies simply through robust exposure to the target language input. The possibility that lower-level parsing may be modulated through an external pedagogical force sends a positive message to L2 instructors.

Are early and late proficient Chinese learners of English able to draw on the native (Chinese) representations in understanding L1 counterfactual statements?

Up next, I shall discuss the accuracy data, which sheds light on the higher-level processing and the representational knowledge involved in inferring/understanding counterfactuality. As reported in the Results Section above, Chinese monolinguals'

correct understanding of the subjunctive mood did not differ in response to differences/changes in the number of available morphosyntatic cues, suggesting that they probably drew on all available representational cues (morphosyntactic, lexical, discourse, contextual) to make sense of counterfactuality. However, advanced L2 learners' correct understanding of counterfactuality seemed to be contributed by the number of available morphosyntactic markers, which is suggestive of the prominent role of morphosyntactic cues in representing counterfactuality. For instance, the L2 learners demonstrated the best accuracy rates reading two-marker (1a-based) sentences (92%). These L2 learners – irrespective of onset age of learning the L2 (early vs. late) – showed more accurate understanding of the subjunctive mood when reading two-marker (1a-based) sentences (*ruguo…dehua*) than one-marker (1c-based) sentences (92 vs. 68%; $t = 2.25$, $p < .05$). Similarly, they exhibited better accuracy rates when reading the two-marker (1a-based) sentences (*ruguo…dehua*) than reading the zero-marker (1d-based) sentences (92 vs. 87%; $t = 2.95$, $p < .05$).

Notwithstanding, the evidence supporting L2 learners' reliance on morphosyntactic representational cues in higher-level processing of counterfactuality is also challenged by two post-hoc test results. And this begs for further examination and explanation. First of all, although the L2 learners' accuracy rates in reading the two-marker (1a-based) sentences (*ruguo…dehua*) were slightly better than the accuracy rates in reading the one-marker (1b-based) sentences (*ruguo…*), the difference is still not statistically significant enough (92% vs. 90%). At the first glance, this does not seem to make a strong case for the prominent role of morphosyntactic markers on the L2 learners' correct understanding of L1 counterfactual sentences; L2 learners are supposed to have (statistically significantly) better performance reading the two-marker (1a-based) sentences than the one-marker (1b-based) sentences. However, a closer look at the nature of the two-marker (1a-based) sentences and the (1b-based) one-marker sentences addresses this concern: The two types of sentences (1a- and 1b-based) are both fronted with the sentence-initial morphosyntactic marker, *ruguo.* It is possible that the sentence-initial marker (*ruguo*) already effectively prepared the L2 learners to better infer the subjunctive mood and the weight of the sentence-medial marker (*dehua*) in the two-marker (1a-based) sentences thus became functionally redundant and slightly dampened. Consequently, the difference (92% vs. 90%) between the two-marker (1a-based) sentences (*ruguo.…dehua*) and the one-marker (1b-based) sentences (*ruguo…*) became less obvious. Thus, despite the lack of significant statistic difference between the two-marker and one-marker (1b-based) sentences, the above account is still suggestive of L2 learners' sensitivity toward morphosyntactic cues (the presence of *ruguo*) – which is characteristic of their L2 (English) representational cues.

The second problematic post-hoc test concerns with the finding that the L2 learners had better accuracy rates when reading the zero-marker (1d-based)

sentences (87%) than reading the one-marker (1c-based) sentences (68%). Again, one would expect that advanced L2 learners whose conceptual representational systems were already entrenched with (English) morphosyntax-based cues would have the worst accuracy rates when the reading materials are deprived of any morphosyntactic cues (1d-based sentences). However, this was not the case; L2 learners still had 87% accuracy rates in reading the zero-marker sentences. This unexpected finding suggests that the L2 learner group did not solely rely on morphosyntactic markers when understanding L1 counterfactual sentences. Specifically, when the sentence stimuli contained salient/sufficient morphosyntactic cues (such as 1a-based sentences), the L2 learners probably drew on L2-based (English) representational cues. On the other hand, when the sentence stimuli did not contain any morphosyntactic markers (as in the case of the 1d-based sentences), the L2 learners probably fell back on their L1 (Chinese) monolingual mode, relying on all available representational cues (e.g. context, lexical, discourse, etc.) to make sense of the subjunctive mood. This – relying on all available cues – probably allowed the L2 learners to better infer the subjunctive mood (in reading the 1d-based sentences) than simply relying on one morphosyntactic marker (in reading the 1c-based sentences); and as shown by the accuracy data, this switch to L1 (native) parser actually allowed them to have satisfactory performance in understanding zero-marker (1d-based) counterfactual statements (87% accuracy rates).

The above switching account is plausible, given that these L2 learners' L1 and L2 parsers and representational systems were recently reawakened and were readily available for use due to their intensive exposure to L1 and L2 input at the time of the study; and these L2 learners were thus capable of immediately switching to the optimal (L1) conceptual representational cues when the reading stimuli were deprived of any salient morphosyntactic cues (see Van Assche et al. 2012 for a similar finding in neurolinguistic studies). This again supports Chamorro et al. (2015)'s view that L2 learners' representational system is *dynamic* in nature and is very sensitive to input change.

The dynamic nature of the linguistic relativity effect on the representational knowledge involved in higher-level processing indicates that the effect can only be captured under *certain* conditions. To capture this effect, the current study manipulated four reading conditions – conditions that varied in terms of saliency of L2-based (morphosyntactic) cues (2 markers vs. 1 marker vs. 0 marker). Chamorro et al. (2015) did not capture such effects on representational knowledge involved in conscious higher-level processing because their reading stimuli only involved two dichotic reading contexts – having and not having L2-based representational cues. And, this probably explains why Chamorro et al. (2015) did not find any representational differences between their (advanced) L2 learners and monolinguals.

Accordingly, based on the analysis of the accuracy data of this study, two important inferences can be made vis-à-vis the two research questions:

- Q1: The 'constraint' as postulated by the Linguistic Relativity principle may also manifest at the representational cues involved in later conscious higher-level processing. Both the L1 and L2 cues are still present in these (advanced) L2 learners' conceptual representational system, making them 'non-native' in both their L1 and L2 in some cases. Namely, cross-linguistic difference is not completely resolved at the representational knowledge involved in conscious higher-level processing. However, this non-nativeness is actually the asset for these advanced L2 learners, allowing them to flexibly use the L2-based (English) representational cues in inferring and making sense of counterfactual statements when the statements contain salient morphosyntactic cues and use the L1-based (Chinese) representational cues in cases where no morphosyntactic cues are available. The flexible use of both L1- and L2-based representational cues enhances, rather than debilitates, L2 learners' understanding of L1 counterfactuality statements.
- Q2: The onset age of learning the L2 (as shown by the MANOVA of the accuracy data) did not seem to exert any significant impact on the L2 learners' conscious higher-level processing of counterfactuality in L1; both the early and late L2 learners' were capable of flexibly drawing on their L1 and L2 knowledge systems for high-order processing and judgement. The fact that the effect of onset age of learning the L2 only affects lower-level initial parsing, but not later higher-level processing, is suggestive of the selective effect of the onset age factor.

Taken together, based on the analysis of the response time and accuracy data, the cognition differences have a far-reaching influence on an (advanced) L2 learners' L1 reading processing. Both the advanced L2 learners' subliminal lower-level parsing and conscious higher-level processing were affected; they were not able to 'consistently' and 'constantly' maintain in the L1 native parsing and representational mode when reading L1 counterfactual statements. However, as noted earlier, extensive literacy experience and active L1/L2 exposure are capable of modulating the lower-level parsing constraint that may result from cross-language differences in cognition, enhancing their parsing speed and efficiency. The Linguistic Relativity Principle sees previously learned language(s) as a source of cognitive constraint, rather than a positive facilitation. However, the present study found that both the early and late proficient L2 learners outperformed their monolingual counterparts in reading L1 counterfactual statements, both in terms of parsing speed and accuracy rates. It is possible that as a result of second language acquisition, L2 learners

are endowed with more enriched parsing and representational cues to examine/interpret a counterfactual event. The above findings call for the need to revisit the Linguistic Relativity Principle in a different (i.e. positive) light. Instead of perceiving such differences as a constraint, the purpose of researching the Linguistic Relativity Principle is to find out the underlying L2 processing mechanism at work and an optimal way to create a pedagogical environment to the best of L2 learners' benefit.

To conclude, the strong version of the Linguistic Relativity Principle, which is challenged by the finding of the present study, can be described using Robert Frost's poem, *The Road Not Taken*:

> Two roads diverged in a yellow wood,
> And sorry I could not travel both.
> And be one traveler, long I stood
> And looked down on as far as I could
> …
> I shall be telling this with a sigh
> Somewhere ages and ages hence:
> Two roads diverged in a wood, and I –
> I took the one less traveled by,
> And, this had made *all* the *difference*. [emphasis added]

In Taiwan – where English education is promoted and obligatory at an early age – Chinese monolinguals are analogous to the travelers who take the path that is "less traveled by," and the bilinguals are like the travelers who take the path that is "grassy and wanted wear." In Frost's literary eyes and for the proponents of the strong version of the Linguistic Relativity Principle, the travelers who take different paths would "never come back" to the vantage point and would be destined to lead *totally* different lives. However, in the eyes of the proponents of the weak version of the Linguistic Relativity Principle, the roads taken by monolinguals and bilinguals are only *partially* different. The present study shows that despite different options in monolinguals' and bilinguals' language experiences, similarities and differences coexist in their linguistic journey; the Chinese-English bilinguals and monolinguals share some common ground (having the same parsing predilection when reading L1 counterfactual statements) and they also differ from each other (drawing on different mental representations in L1 reading). Despite the underlying differences, as shown by the accuracy data collected from the advanced Chinese learners of English, we are able to prove these L2 learners' counterfactual reasoning is nearly on a par with that of English speakers. In light of this, in examining the journey undertaken by bilinguals in the lens of the Linguistic Relativity Principle, we should probably perceive the bilingual journey in a positive light; any languages at our disposal enrich, rather than constrain, our minds.

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Abbreviations

AR	accuracy rates
ERP	event-related potential
F	F-statistic
FL	foreign language
L1	first language
L2	second language
MANOVA	multivariate analysis of variance
N	number
P	probability value
Q	question
RT	response times
VMMN	visual mismatch negativity

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Appendix. The text used for the self-paced reading experiment

++++很小的時候，看著表姐背著書包回來，總是會邊寫功課邊抱怨那有多無聊，而她有多不想讀書。但是那時候我心裡總是會想，如果我是表姐的話，我就要把所有的課本都讀完[3]!我那時候可以上學，我一定不會抱怨。[4]

Question 1: 以上是作者表姐的自述。(答案：否)
Question 2: 作者有以上想法時已經可以上學。(答案：否)

++++會寫字是多麼神奇的事！課本裡的故事看起來都好有趣。後來我上了小學，我發現我很喜歡故事，但是我討厭一堆的數字，常常心想，這世界上沒有數學的話，學校就會變成一個一百分美好的地方。[5]小學讀著讀著，竟然也開始膩了。到了四年級，就常常心想怎麼離畢業還這麼久。我想變成國中生。國中感覺很好玩，有學校發的書包、還有美麗的制服。如果我可以立刻變成國中生的話，我就要每天穿著裙子、背著書包、快樂地去上學。[6]

Question 3: 作者其實當時也知道對她和任何人而言，世界上是不可能沒有數學。（答案：是）
Question 4: 作者有上述想法時還不是國中生。(答案：是)

++++後來終於把小學讀完了。進入了國中，我漸漸地發現國中生活不僅沒有比較有趣，還變得很累。每天都要上課到五、六點，功課變得很多很難。老師們都很嚴格，而且還常常對我們說，如果我們總是打瞌睡，以後就很難找到好的工作；[7] 將來沒有理想的工作，我們就沒有穩定的生活；[8] 這輩子沒有安定的日子，我們的人生選項就很有限。[9] 我覺得很可怕，所以要好好讀書，讓自己變成有出息的人！

Question 5: 作者進了國中之後，發現國中真的非常好玩。(答案：否，filler question)
Question 6: 作者國中上課時總是不清醒。(答案：否)
Question 7: 作者老師認為作者未來不會從事理想的工作。(答案：否)
Question 8: 作者老師認為作者未來日子會不安定。(答案：否)
Question 9: 作者的國中老師告誡他們要努力讀書，以免成為沒有出息的人。(答案：是，filler question)

++++國中另外一個不好玩的地方，是同學們變得很喜歡吵架，他們討厭老師，也不喜歡遵守規定。老師常常嘆著氣對他們說，他們可以把犯錯的時間拿來讀書的話，他們一定會變得很優秀。[10]

Question 10: 作者國中時期常常和同學吵架。(答案：否，filler question)

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3. Two-marker: 如果…的話，
4. No marker
5. One-marker: …的話，
6. Two-marker: 如果…的話，
7. One-marker: 如果…，
8. No marker
9. No marker
10. One-marker: …的話，

Question 11: 作者的同學不會把時間拿來讀書或做其他有意義的事。(答案：是)

++++最可怕的是，連我自己也變得不一樣了。原本很期待穿美麗的裙子，真正進入國中，反而很討厭穿裙子。進國中前一直很想背學校發的書包，真正進入國中卻覺得每天都背一樣的書包很無聊。每天過的人生都差不多，一直讀書考試也沒別的好玩的事，一點都不快樂！國中時，我還曾經天真地認為，如果我再也不用讀書的話，我可以快樂地做我喜歡的事，[11]不需要為了分數挨打、花錢補習、每天苦讀，真是太痛苦了。

Question 12: 作者上學後其實不曾喜歡過穿制服。(答案：是，filler question)
Question 13: 作者雖然覺得讀書是苦差事，但是還是得讀書。(答案：是)

++++好不容易國中畢業了，國中老師都說高中比較好玩，有更多社團可以選擇，還可以上自己比較喜歡的課。沒想到我因為高中入學考試考得不好，沒有進入理想的高中，我心中很恐懼，如果自己一間大學都考不上，我人生就沒有希望了。[12]因此我高中的日子不斷地在讀書，幾乎不參與任何社團活動，下課也不和同學出去玩。放學後，我就馬上進補習班讀書上課，就這樣很緊繃得過著高中三年的每一天。我那時候覺得，如果不辛苦鞭策自己的話，世界會毀滅。[13]

Question 14: 作者高中順利進入理想的學校。(答案：否，filler question)
Question 15: 作者在高中時期已經確認自己考不上大學。(答案：否)
Question 16: 作者高中時期隨時都在努力鞭策自己。(答案：是)

++++後來高中最後一年，在參加第一階段大學入學考試的時候，我還是沒有考好。我既難過又害怕，因為第二階段的大學入學考試是我最後的機會了。我一定要成功！為了衝刺第二階段的考試，我搬到學校附近租房子自己住，才可以節省通勤的時間讀書。後來成績公佈後，我果然成功地考出前所未有的好成績，進入國立台灣師範大學英語系就讀。我常常想，沒有這段獨居努力的日子的話，我應該考不上國立台灣師範大學了。[14]

Question 17: 作者高中時期一直過著群體生活。(答案：否)
Question 18: 作者高中努力了三年之後，第一階段考試就考上理想大學。(答案：否 filler question)

++++我熱愛我在國立台灣師範大學的每一天，我把握了許多學習機會，充實自己的大學生活！沒有之前的失敗，我永遠都不會知道努力的重要。[15]如果沒有前面那一番折騰，我不會擁有這麼美好的大學四年；[16]如果沒有前面的努力，我不會明白我現在所擁有的一切有多麼珍貴。[17]我也學習到了，其實人生沒有什麼東西值得後悔，因為每個

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11. Two-marker: 如果…的話，

12. One-marker: 如果…，

13. Two-marker: 如果…的話，

14. One-marker: …的話，

15. No marker

16. One-marker: 如果…，

17. One-marker: 如果…，

經歷都有它的價值。更何況，我又怎麼會知道，換作是另一個選擇的話，就一定會更好？[18]

Question 19: 作者從過去的失敗中了解努力的重要。(答案：是)
Question 20: 作者經歷了一番折騰才考上大學。(答案：是)
Question 21: 作者先前高中時期仍未立志發奮向上。(答案：否)
Question 22: 作者覺得每件事都有它發生的意義，無須後悔。(答案：是，filler question)
Question 23: 如果人生能重來，作者不見得會希望改變他的人生選擇。(答案：是)

English Translation of the Text

++++When I was very young, I would watch my cousin come home from school with her backpack, and she would always do her homework while complaining about how boring everything was, and how much she didn't want to study. But at that time, in my mind I would think, if I were my cousin, I would've finished reading all the textbooks! If I were able to attend school, I definitely wouldn't complain.

Question 1: The text above is the author's cousin's autobiography.
Question 2: When the author had these thoughts, she was at the age when she was able to attend school.

++++Being able to write is such an amazing thing! It seems as if all the stories written in school textbooks are so interesting. Later, after I started elementary school, I realized I loved reading stories, but I hated anything to do with a bunch of numbers, and in my mind, I would think if math did not exist, then this world would be a perfect place. After continuously studying for years, elementary school started getting tiring. When I was in 4th grade, I would often think why it was so long until my elementary school graduation. I wanted to be a middle school student. Being a middle school student sounded like fun. The school gave out backpacks, and there were beautiful uniforms. If I could immediately become a middle school student, I would wear a skirt, take my backpack, and happily attend school every day.

Question 3: At that time, the author knew that Math was and should still be a part of her and everyone's life.
Question 4: The author was not yet in middle school when she had these thoughts.

++++Finally, I finished elementary school. After entering middle school, I slowly began to find out that middle school was not only not more fun, but was also very tiring. Classes didn't end until 5 or 6 every day, and homework became too excessive and too hard. The teachers were also very strict, and often told us, if we always dozed off, it would be hard to find a good job in the future; if we didn't have a good job, then we wouldn't have stable lives; without a stable life, our options in life would be very limited. I thought it was a scary thought, so I would have to study hard so I could become someone who had worth.

Question 5: After entering middle school, the author thought that middle school really was fun.
Question 6: While in middle school, the author was never alert during class.
Question 7: The author's teacher believed that the author would not find a desirable job in the future.
Question 8: The author's teacher believed that the author's future life would not be stable.
Question 9: The author's middle school teachers told them that they had to be diligent in their studies, so that they would not eventually become people without worth.

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18. One-marker: …的話，

++++Another thing that wasn't fun about middle school was that my classmates started to like to pick fights; they hated the teachers, and didn't like the counselor's rules. The teachers would often sigh and tell them, if they were to use the time they spent misbehaving to study, they would definitely become very good students.

Question 10: The author's had a lot of confrontations with her classmates.
Question 11: The author's classmates wouldn't use their time to study or do other things that had significance.

++++The most frightening thing was that even I began to change. I initially anticipated wearing a pretty uniform, but after starting middle school, I began to hate wearing skirts. Before entering middle school, I really wanted to use the backpacks that the school gave out, but after really entering middle school, I found that using the same backpack everyday got to be very boring. Daily life was always the same, always studying, taking tests, and there was nothing fun to do, which was definitely not joyous! During middle school, I had also once innocently believed, if I didn't have to study, I would be able to happily do the things that I wanted to do. It wouldn't have to be because of points that I was punished, or had to spend money getting tutoring; this daily struggle with studying was really too painful.

Question 12: After starting school, in reality, the author didn't ever like wearing a uniform.
Question 13: Even though the author felt that studying was an arduous task, she still had to study.

++++After I finally graduated from middle school, the middle school teachers all said that high school was more fun, there were many more school clubs to join, and we could take courses that we wanted to take. I didn't think that I would do poorly on my high school entrance test, and not get into a good high school; I was filled with fear, if I was unable to get into college, then I had no hope in life. Thus, my high school experience was filled with nonstop studying. I hardly participated in any clubs, and after school, I never went out with my classmates. After school, I would go directly to after-school tutoring, and continue to study. This stressful lifestyle is how I spent the entire three years of my high school career. At that time, I thought, if I didn't push myself, then the world would end in disaster.

Question 14: The author tested into the high school she wished to attend.
Question 15: When the author was in high school, she was already certain that she would not be able to get into a good university.
Question 16: During her high school years, the author was always diligently studying and pushing herself.

++++Later, during my last year of high school, during the first phase of college entrance testing, I still did not test well. I was both sad and scared, because the second phase of college entrance testing was my last opportunity. I had to succeed! As a final resort toward the second phase of testing, I moved close to school and rented a house and lived there alone, so I could save the time I spent commuting in order to study. After the test results were announced, surprisingly, my scores were considered as some of the better scores, and I entered into the English department at National Taiwan Normal University. I often think, if I had not spent these solitary days studying, I would not have been accepted to National Taiwan Normal University.

Question 17: The author had never lived alone during her high school years.
Question 18: After diligently studying for three years in high school, the author tested into her ideal university at her first testing attempt.

++++I loved each day I spent at National Taiwan Normal University. I took every learning opportunity available to me while at university, and enriched my college experience! Without prior setbacks, I never would've understood the importance of diligence. If I didn't have the previous repetitive lifestyle, I wouldn't have such a beautiful college experience; if I hadn't had put in effort, I wouldn't understand that everything that I have is valuable. I also learned that there's really nothing in life to regret, because every experience has its value. Moreover, how would I know that if the alternative was another option, that it would be any better?

Question 19: The author realized the importance of working hard through past failures.
Question 20: The author repetitively studied in order to test into a good university.
Question 21: During her initial years of high school, the author was not determined to work hard to reach the top.
Question 22: The author believes that every experience has its purpose, so there is no need to regret.
Question 23: If she could repeat her life, the author would probably not want to change her options in life.

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