DEVELOPING THINKING IN L2 SPEAKING: EVIDENCE FROM SPATIAL-TEMPORAL SYSTEM IN CHINESE AND ENGLISH LEARNERS

Pei-ni Causarano

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DEVELOPING THINKING IN L2 SPEAKING: EVIDENCE FROM SPATIAL-TEMPORAL SYSTEM IN CHINESE AND ENGLISH LEARNERS

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DISSERTATION

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DEDICATION

This dissertation is dedicated to my family and students, who are always my inspirations as I study thought and language.
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Thanks to my parents providing me a good education and encouraging me to explore my passion in studying foreign languages and in being a foreign language educator. I left my home country, Taiwan, more than 10 years ago to accomplish my dream as a scholar in language education. Thanks to my dissertation chair, Dr. Holbrook Mahn, who has been encouraging me to study the development of the system of meaning in my trilingual son, Vittorio. Thanks to my husband, Antonio, who constantly supports me spiritually and scholarly during this long journey. Thanks to my committee members, Dr. Melisssa Axelrod, Dr. Jill Morford, and Dr. Janet Peterson, who have been patient and supportive until the final stage. I am also thankful to friends in Albuquerque, NM and Alfred, NY, and my dear Taiwanese and Italian families, who gave me and my family the warmest support.

This dissertation is not only my scholarly work, but also my life experience. I developed my profession through these years, teaching and consulting in various settings. I experienced colleagues and students from diverse backgrounds. We also observed our son’s language development and his change of worldview. Through the years, my ideas have evolved. I have come to realize that the exploration of thought and language is my lifelong passion and journey.
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ABSTRACT

Spatial and temporal expressions cross-linguistically are metaphorical can present a difficult challenge during second language acquisition. This dissertation expands on Slobin’s (1996) study of “first-language thinking in second-language speaking,” and applies linguistic relativity theory and Vygotsky’s theory on thought and language to investigate how L1 thinking influences L2 speaking in Chinese native speakers learning English and English native speakers learning Chinese. It examines (a) habitual language use of spatial and temporal referents cross-linguistically and (b) dynamic changes of spatial and spatial-temporal expressions in L2 learners across proficiency levels.

Some 41 CLLs and ELLs at four proficiency levels participated in this study. Data were collected via an experimental approach and were analyzed by narrative analysis with statistical support. Each participant told two stories in the Chinese and English languages. By comparing native language data, it was found that English speakers used more horizontal and vertical terms to reference physical space, while Chinese speakers used more horizontal and vertical terms to reference time. Their habitual language use
carried over to their L2 speech. The dynamic changes of using spatial and temporal referents in L2 speakers across proficiency levels are consistent with Vygotsky’s framework of verbal thinking. The results also suggested that the characteristic of Chinese as a highly metaphorical language have an impact on its speakers’ thoughts, which is the center of the linguistic relativity theory.
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Chapter 1

Introduction

Background

One’s native language plays an important role during second language acquisition (SLA). First language (L1) influence has been suggested as one of the most important and controversial variables in the field of SLA across behaviorism, nativism, and sociolinguistics (Gass & Selinker, 1992). However, debates on how L1 influences SLA have occurred for decades. According to earlier behaviorist researchers (Lado, 1957; Skinner, 1957), language acquisition entails learning a set of “habits” for responding to stimuli in the environment (Gass & Selinker, 1992). Second language (L2) learning is considered complicated because first (L1) habits are deeply entrenched and can either help or inhibit the acquisition of L2 (Ellis, 1985; Odlin, 1989).

The generative linguistic approach, such as minimal pairs and syntactic analysis, are most commonly applied to study the L1 influence by analyzing patterns of errors at the phonological and syntactic levels (Jarvis, 1998). Although the way linguistic theory analyzes language data through a systematic approach leads SLA research to a much more autonomous field of inquiry (Mitchell & Myles, 2004), it is important to consider sociolinguistic and psycholinguistic perspectives in the SLA process.

Psycholinguistic studies in SLA acknowledge the language processes of the language learner and the differences between individual learners’ perspectives, whereas sociolinguistic approaches to SLA see learners as social beings (Mitchell & Myles, 2004). Most psycholinguistic and sociolinguistic researchers suggest language learning is a dynamic practice, and language and thought are interrelated during this dynamic process.
Languages vary from community to community and from individual to individual. The differences in language use and language acquisition depend on interpersonal and intrapersonal factors, such as culture, social interactions, and internalization of language and world knowledge (Ochs & Schieffelin, 1984, 1995).

Recent studies on cross-linguistic influence at the conceptual level in SLA have drawn increasing attention (e.g., Jarvis & Pavlenko, 2008). Researchers have suggested that L2 learners rely on their L1 in developing concepts in their L2 to mediate their performance in L2 (Lantolf & Thorne, 2006; Boroditsky, 2001; Kecskés & Papp, 2000). Learning an L2 involves a socio-cultural interaction process between learners’ L1 and L2 (Lantolf, 2000). L1-based concepts usually reflect on one’s language use in their L2, and this cross-linguistic influence usually is overstressed by language instructors or researchers as errors or inappropriate usages. To minimize errors that occur in L2, most language instructors emphasize language structural practice and drills (Warschauer & Meskill, 2000; Talia, 2009).

The awareness of L1-based concepts can help language educators to provide effective support to contextualize the cross-linguistic and cross-cultural features of the target language community. It is important to understand the relationship between linguistic and cognitive development in L2 learners from cross-linguistic and intrapersonal perspectives in order to help learners conceptualize and internalize the target language and culture. For instance, because Chinese is a highly metaphorical language, when Chinese people write in English, they struggle with rhetorical conventions in L2. On the other hand, English speakers tend to reverse word order when speaking Chinese because Chinese logic, from general to specific, is very different from
English. Second language learners commonly carry L1 conceptualization to their L2 thinking, speaking, and writing.

**Significance of the Study**

Current literature on foreign language acquisition focuses mainly on the study of grammatical errors (Ellis, 2006; Ferris & Robert, 2001). For instance, some types of high frequency errors in Chinese language learners have prompted Chinese linguistic research and instructors’ attention (Cai & Wu, 2005; Chan, 1996). However, as a Chinese and ESL instructor at all levels, I find some usages in both L1 and L2 not easy to comprehend by grammatical practices. Among those (i.e., Clark, 1973), the acquisition of a new system of expressing reference to time and space is one of the most salient obstacles to fluency for Chinese and English language learners. The expressions of spatial-temporal metaphors in students across different proficiency levels are manifested as continuous errors at the semantic, syntactic, and most frequently, at the pragmatic level.

This is because of the following factors: First, spatial and temporal expressions cross-linguistically are metaphorical in nature, and the metaphor is the most difficult concept during first and second language acquisition (Johansson Falck, 2012). Second, space is the basic domain for time expression in world languages, and speakers express temporal systems and spatial metaphors differently from language to language (Johansson Falck, 2012). When L2 learners are acquiring a new metaphorical conceptualization of time and space, the difficulty manifests as a pattern of errors at the semantic, syntactic, and pragmatic levels.

Although the area of SLA as a mediated process has been studied intensively in recent decades (Lantolf, 2000), the influence of the L1 on the acquisition of semantics
and pragmatics in L2 receives little attention in SLA scholarship (Jung, 2001). Furthermore, although extended studies have compared time-space metaphors cross-linguistically (Núñez & Sweetser, 2006; Levinson, 2003; Radden, 2003; Pederson, Danziger, Wilkins, Levinson, Kita, & Senft, 1998; Pederson, 1995), little research has been done on how L2 learners develop conceptions in the domain of space and temporal systems during SLA.

**Research Questions**

To fill the gap, the goal of this dissertation is to conduct an empirical study to explore L1 influence and the formation of L2 concepts in SLA by examining the speech patterns in the domain of space and temporal systems between two distinctive language communities—Chinese and English learners. The understanding of cross-cultural and cross-linguistic influence and the formation of L2 linguistic and cultural conceptions will be driven by the following research questions:

1) How do Chinese and English speakers contextualize and express spatial-temporal conceptions differently in their L1? To what extent does habitual language use reflect different dimensions of spatial-temporal metaphors, including the vertical, horizontal, and sideways planes?

2) To what extent does L1 influence the development of spatial-temporal conceptualizations in L2 across different proficiency levels? How do Chinese and English language learners conceptualize spatial-temporal metaphors, including the vertical, horizontal, and sideways planes, while speaking in their target languages?
It is hypothesized that Chinese and English speakers express space differently, which also affects the different ways of conceptualizing a temporal system (i.e., Boroditsky, 2001; Levinson, 2003). Consequently, errors in L2 learners’ cross-proficiency level are due to the cross-linguistic and cross-cultural differences in perceiving the world instead of merely the transfer of L1 structures. The different language use in Chinese and English reflects the inter-relationship between language and thought. Habitual language use within a speech community affects speakers’ thought, which not only shapes their thinking in the context of within a specific sociocultural context but also trains them to speak and communicate in a certain way. When people learn an L2, their habitual thoughts in L1 are carried to their L2 speaking. These cross-linguistic variations in Chinese and English speakers are internalized from interpersonal processes into intrapersonal processes (Vygotsky, 1978). The data of narrative samples in this study, collected from Chinese and English language learners across proficiency levels, will reveal whether learning an L2 changes their conceptualization of temporal and spatial systems.

To understand the cross-linguistic and cross-cultural influence of the L1 on the acquisition of semantics and pragmatics in L2 learners, this dissertation will analyze the relationship between thought and language first by applying the Whorfian Linguistic Relativity Hypothesis to investigate “L1 thinking in L2 speaking” (Slobin, 1996). Then, Vygotsky’s (1987) sociocultural approach will be applied to examine the dynamic development between thought and language in L2 concepts of the spatial and temporal systems.
Both Vygotsky’s and Slobin’s approaches consider a speaker as a systematic and dynamic thinker. Dan Slobin’s (1996) “thinking for speaking” indicates that one’s native language shapes the nature of habitual thinking. Moreover, Slobin’s (1996) “first-language thinking in second-language speaking” explains that children’s language experience in L1 constrains their sensitivity to a second language. Thus, it is common to see L2 learners’ second language structures influenced by their L1 linguistic categories (Slobin, 1996). For instance, due to the lack of conjugations in the Chinese language, Chinese-speaking English learners tend to drop plural or tense markers while speaking English. On the other hand, due to the lack of systematic use of classifiers in the English language, it takes English-speaking Chinese language learners a long time to master the usage of classifiers in the Chinese noun system. Vygotsky’s ideas about thought and language focused on interpersonal and intrapersonal activities. His sociocultural approach studied the historical development of the internal system of meaning created in the human psyche through the unification of thinking and speaking processes (Mahn, 2012). Vygotsky’s interests in studying the unity of the speaking and thinking process, which is mediated by internal thought and external speech, contribute to the understanding of the conceptual development during language acquisition. According to Vygotsky’s sociocultural theory (1987), the process of language development is dynamic, and language and thought are interrelated. According to Vygotsky (1987), language is a facilitator for developing thinking. When people learn an L2, they rely on their linguistic and sociocultural experience in L1 to develop speech and thought in L2. Language learning requires a process of social interaction in which L2 learners construct new forms and functions by negotiating meaning, role relationships, and their social-cultural
identities (Ellis, 1999). The examination of L1 influence on L2 needs to analyze not only the linguistic structures but the underlying meanings.

The research questions and hypothesis in this study are addressed using a mixed method of discourse analysis with statistical support. The method is to expand on Berman and Slobin’s (1994) study using narrative retellings of the Frog Story Study. Findings from Frog Story Study suggest that language variations reflect people’s thinking in different speech communities, and native language use is deeply rooted in the speaker’s mind and affects one’s experiences in acquiring another language (Slobin, 1996). The method provides cross-linguistic, cross-cultural, and cross-proficiency-level data to investigate how L1 influences the way that learners conceptualize the domain of space and temporal systems in the target language.

The overarching goal of this dissertation is to provide implications for SLA pedagogy and research. It is important for L2 educators to understand the relationship between linguistic and cognitive development in L2 learners from both cross-linguistic and intrapersonal perspectives in order to help learners conceptualize and internalize the target language and culture. The understanding of cross-linguistic and cross-cultural variations in L2 learners can provide effective L2 instruction to overcome or decrease language interference during the learning process.
Chapter 2

Review of the Literature

This section presents an overview of the existing literature that is relevant to the research presented here. Space is fundamental for human cognition across languages and cultures. The use of the spatial domain in world languages is due to the similar biological and physical environments in human world structures, and the differences in worldviews influence the ways that speakers express space differently across different languages (Levinson, 2003). In investigating how cross-linguistic and cross-cultural variations of spatial and temporal language uses between Chinese and English influence speakers’ acquisition of L2, three main areas will be reviewed: (a) differences and similarities of spatial-temporal concepts in Chinese and English, (b) how language and thought are interrelated, and (c) the development of concepts in second language acquisition (SLA).

Temporal Systems in Chinese and English

From an anthropological and philosophical perspective, Chinese has been considered as back to the future linguistically and culturally, whereas the concept of time in English is front-to-the-future orientation (e.g., Alverson, 1994) as presented in Figure 1. For instance, qián-rén (‘front-person’) means frontiers in the Chinese language. English speakers use “FOREsee” to predict the future.

Figure 1. The Back to the Future V.S. Front to the Future Orientation

![Diagram](image)
However, is it true that Chinese and English are contradictory in terms of the time-space metaphor? This section of literature review draws from theoretical frameworks in systematic correspondences between the domains of temporal expression in Chinese and English (Clark, 1973; Fillmore, 1971; Traugott, 1978). There are three subsystems of linguistic time across languages: aspect, tense, and temporal sequencing (Traugott, 1975, 1978). Anderson (1972, 1973 cited in Traugott, 1978) describes the fundamental frameworks to structure time in languages:

Tense locates what is talked about on an imaged timeline with respect to the speakers. Temporal sequencing locates events with respect to each other at points on the timeline. Aspect assigns limits and bounds to events. All three temporal subsystems are to be derived in a grammar from underlying locatives (p. 209).

Although these subsystems configure the semantic level of spatial and temporal expressions in language, different types of language represent degrees of predominance in one system over the other. In Chinese, there is no tense for expressing time, but there are extensive usages of aspect as in (1a-c) and serialization as in (1c-d) in expressing temporal sequencing. The linguistic conventions I used in this paper followed the guidelines in the LSA Style Sheet as in Appendix A, and the abbreviated glosses were listed as in Appendix B.

(1) a. wǒ zài chī wǎn-fàn b. wǒ chī guò wǎn-fàn
1sg at- PROG-ASP eat late-meal sg eat across-experiential-ASP late-meal
‘I am having dinner’ ‘I had dinner’

c. wǒ chī wǎn-fàn le
1sg eat late-meal completive-ASP
‘I have already had dinner’

\[
d. \text{wǒ shàng xīngqí qù Zhōngguó} \quad e. \text{wǒ xià xīngqí qù Zhōngguó}
\]

1sg up week to China \hspace{1cm} 1sg down week to China

‘I went to China last week’ \hspace{1cm} ‘I will go to China next week’

In Chinese, serialization and aspects are frequently used to express temporal relations but not tense; in English, tense deixis are extensively used, and serialization plays a less significant role relatively (Traugott, 1974, 1975, 1978). Different systems of temporal expressions between Chinese and English sometimes are misleading in that Chinese speakers conceptualize time differently from English speakers, such as the assumption that Chinese is back-to-future oriented, and English is future-to-back oriented.

As the examples in (1) show, temporal aspects in Chinese are mostly derived locatives, such as zaì ‘at,’ guò ‘across,’ shàng ‘up,’ and xià ‘down.’ In English, there are extensive uses of locatives in temporal systems, such as \textit{in the morning, at night, before going to bed, after shower}, etc. These expressions in both the Chinese and English patterns show that all three temporal subsystems are derived from the underlying locatives in the grammatical systems (Anderson, 1971; Traugott, 1978). The commonality of using locatives in temporal expressions can be related to how humans experience time. As Traugott (1975) contends, we conceive physical time as “flowing in an irreversible direction,” and it is “correlative to our variable awareness of duration” (p. 207). The following section will show the commonality and differences in temporal conceptualizations between Chinese and English. The following sections discuss spatialized conceptions for time in the Chinese and English languages.
**Moving-time vs. moving-ego.** Much of the literature has established two systems of space-time metaphor in language: *moving-ego* and *moving-time* (Bierwisch, 1967; Clark, 1973; Gentner, 2001; Lakoff, 1993; Moore, 2001; Traugott, 1975, 1978). In the *moving-ego* system, a speaker moves forward in the timeline, from past to future as in Figure 2. Thus, future events are conceived as in front and past events as behind. The temporal metaphors in the *moving-ego* system involve speaker deixis, depending on the moment of the utterance, and refer to the usage of tense deixis (Traugott, 1975, 1978). The expression for tense deixis is front to the future. In other words, the temporal expressions in tense shift reference with respect to the moment of speaker. While the speaker constantly moves, the past events leave behind the speaker, from the speaker’s perspective.

This expression involves a space-to-time metaphor, using the speaker’s space to explain the speaker’s time. In other words, the temporal expressions in tense shift reference with respect to the speakers’ moment of utterance. While the speaker constantly moves, the past events leave behind the speaker, from the speaker’s perspective.

**Figure 2. Perception of Time as Moving-ego**

(2) a. We left all that behind us.

b. We will go forward into the future with confidence.

c. We face the future with confidence.
d. We have much to look forward to in the years ahead.

The instances of spatial-temporal expressions in English presented in (2) (Traugott, 1975, p. 216) indicate that characteristics of tense diexis rely highly on the speaker’s perspective. From the speaker’s viewpoint, the timeline path moves from back to front. What we have experienced is put behind, and what will be experienced will be in front (Traugott, 1975). Therefore, front/forward/ahead are the metaphorical expressions for future events, whereas back/behind are for past events.

‘Go to the future’ is the schema for English space-time concepts, especially in the sense of tense usage. The construction be going to has been expressed for planned or intended future actions. This construction uses the concept of ‘go for the action in the future,’ such as I am going to do homework after the snack, or he is going to visit his grandma this weekend. This concept is commonly found in many other world languages, such as French, Spanish, Palestinian Arabic, Hebrew, Kishamba, and Krio, where speakers use come-go for past-future tense or aspect (Givón, 1973; Traugott, 1975). As shown in Example (3) in Swahili and in English, Givón (1973) suggests that come is derived from the lexicon from, which has presuppositions for the time before current time and go as related to to with respect to goal, the time after the current time.

(3) a. ha-wa-ja-enda       b. I am going to do it.

not- 1sg.-come-go

‘I didn’t go’

In the moving-time metaphor, the speaker stands still, and time flows by from future to past, so that the past events are in front and the future events are behind, as in Figure 3. This can be seen in the following instances in English, ‘the day before
yesterday,’ ‘the years ahead,’ ‘the day after tomorrow,’ ‘the coming years,’ and ‘the following years’; also, in Chinese, qù-nián (‘go-year’) ‘last year,’ qían-nián (‘front-year’) ‘the year before last year,’ hoù-tiān (‘back-day’) ‘the day after tomorrow.’

**Figure 3. Perception of Time as Moving-time**

![Moving-time diagram]

Because there is no tense deixis in the Chinese language, the temporal system does not involve a moving-ego temporal system. It seems that Chinese conceptualize the temporal system as moving-time. While, in English, though temporal expressions are not directly related to tense usage, English speakers also conceptualize the temporal system as moving-time.

However, the assumptions of moving-ego/moving-time can create confusion, especially in language pedagogy. The confusion of moving-ego vs. moving-time among the speech community should be clarified as to whether it is using tense or not. While tense deixis applies, the underlying structure involves the concept of the moving path of a speaker (Traugott, 1975). Otherwise, the temporal system should be conceptualized as what Traugott (1975) suggests is a temporal system in world languages as sequence is a relative position on a path instead of moving-time.

**Sequence is relative position on a path.** As Traugott (1975) and Clark (1973) point out, to use *front* as a future metaphor from the speaker’s perspective, but to use *behind* as future according to events, is misleading. They suggest that the correlation *earlier* as front and *later* as behind should reference the temporal sequencing of events rather than of the speakers. Therefore, earlier events always will refer to the front, later
events to the back. This assumption has been proposed as sequence is relative position on a path (Moore, 2001; Traugott, 1985). As in Figure 4, the earlier event, A, is in front of the current moment, whereas the later event, B, in behind the current moment.

**Figure 4. Perception of Time as Relative Position on A Path**

![Diagram showing earlier(front) and later(back) in relation to now.]

From this matrix, we will find that both English and Chinese use front/back as a metaphor in expressing sequencing. The spatial metaphorical expressions are indeed relative to the event sequences rather than to the speakers. Tense involves speaker deixis, and sequencing involves the ordering relationships in respect to different events but not to the speaker (Traugott, 1975). Therefore, there is no tense deixis involved in the metaphors for sequence is relative position on a path. It is common in language to conceptualize time based on event sequencing rather than on the speakers’ deixis. Traugott’s (1975) examples as shown in Example (4), spatial metaphors in temporal relations, are different in terms of time relative to the current moment.

(4) a. We had dinner before we watched the movie.

  b. We will have dinner after watching the movie.

  c. We watched the movie after we had dinner.

  d. We will have dinner before watching the movie.

  e. The reception will be provided following the speech.

  f. Lucy had left on vacation on the Wednesday preceding Thanksgiving Day.

  g. We went shopping on the Black Friday following Thanksgiving Day.

  h. Lucy will leave for vacation on the Wednesday preceding Thanksgiving Day.
i. We will go shopping on the Black Friday following Thanksgiving Day.

There is no tense deixis for the expression of before, preceding, former, after, following, and later, which means that these spatial metaphors in time are used only in the expression of time or space deixis, regardless of tense. Without usage of tense based on speakers’ deixis, Chinese instead expresses temporal sequencing by indicating event relationships. Except for the expression of speakers’ deixis, English also relates sequence as relative position on a path, as in Chinese. This commonality can be found in the metaphor of time as a river in both the Chinese and English languages. The most famous metaphor to represent the Chinese concept of time as a river is seen in Example (5) with water moving from front to the end of river.

(5) cháng-jiāng hòu làng tuǐ qián làng

Yangzi-River back wave push front wave
‘the waves behind drive on those before, so the new excels the old’

The thing that occurs more recently tends to appear closer to us in terms of our visual line, and the things that occur subsequently tend to be farther from our vision line. The expressions in Chinese, qián-yī-tiān (‘front-one-day’) ‘one day ago’ and qián-liǎng-tiān (‘front-two-day’) ‘two days ago), are similar to the English expressions. Because it is more natural to perceive things that take place immediately in front of us, most of the spatial metaphors in time in both English and Chinese express earlier events as positive terms, such as come, front, before, and early, whereas later events, such as go, back, after, and later, are considered as negative terms (Traugott, 1975).

As mentioned in the previous section, among those temporal sequencing expressions, both Chinese and English use horizontal spatial dimension, but only Chinese
has a vertical metaphor for a temporal system. The following sections will discuss the similarity and differences of temporal expressions in both Chinese and English.

**Horizontal temporal sequencing.** Among spatial metaphors of horizontal dimension, *front-back* in temporal expressions is more common than sideways across languages due to our vision line (Traugott, 1975). Again, Traugott’s (1975) examples in (6) to (8) demonstrate that the differences in using these temporal terms are not relative to the current time but indicate the relationships between events.

(6) a. We have much to look *forward* to in the years *ahead*.
   b. To push a deadline *ahead* one day from Tuesday to Monday.

(7) a. We will *go forward* into the future with confidence.
   b. Can we move the meeting next week *forward* to this Friday?

(8) a. My uncle is a little *behind* the times.
   b. We are currently one week *behind* on our shipping schedule.

Similarly, the uses of *qián/hoù* (‘front/back’) as spatial-temporal metaphors in Chinese to indicate the points of time *past-future* are used frequently on a daily basis. Chinese use *qián* (‘front’) to indicate events that happen earlier and *hoù* (‘back’) for events take place later. Similar to *before* and *after* in English, *qián* and *hoù* are applied to any point of time in referring to the position of events in relation to the present, past, or future. Examples (9) and (10) are the symmetric examples of time aspect indicating the relative time point based on the speaker’s anchor. *Qián/hoù* ordering is also the basic for serialization as in Examples (11) and (12). As a Chinese proverb in Example (13), the expression of *qián- rén* (‘front-person’) ‘predecessor’ and *hòu- rén* (‘back-person’) ‘descendants’ to indicate different generations are used in classic Chinese scripts. These
usages now are replaced by *qián*-bei (‘front-generation’) ‘old-generation’ and *hòu*-bei (‘back-generation’) ‘young-generation’ to carry the same meaning. Another similar usage that frequently appears in the modern Chinese language is *qián*-zhě (‘front-person’) ‘former person’ and *hòu*-zhě (‘back-person’) ‘latter person.’

(9) a. *qián*-tiān  b. *qián*-nián  c. *rì*-qián
    front-day  front-year  day-front
    ‘the day before yesterday’ ‘the year before last year’ ‘days ago’

(10) a. *hòu*-tiān  b. *hòu*-nián  c. *rì*- *hòu*
    back-day  back-year  day-back
    ‘the day after tomorrow’ ‘the year after last year’ ‘days later’

(11) a. xīn nián de *qián* yì tiān
    New year POSS front one day
    ‘The day before the New Year Day’
    b. xīn nián *qián* xì jiào chú-xì
    pass year front night call eliminate-night
    ‘the night before New Year is called New Year’s Eve’

(12) chú-xì de *hòu* yì tiān jiào xīn nián
    eliminate-night POSS back one day call new year
    ‘The day after New Year’s Eve is called New Year’

(13) *qián* rén zhòng shù, *hòu* rén chéng liáng
    Front person plant tree, back person enjoy cool
    ‘predecessors’ hard working benefits the later generation’
The spatial-temporal expressions in Chinese rely extensively on the serialization of the moving path (Scott, 1989). Among those, although *qián/hòu* (‘front/back’) ordering is the most basic in indicating serialization, *shàng/xià* (‘up/down’) ordering is also common as a temporal indication term in Chinese, which shares very similar features to *qián-hòu*. Spatial-temporal expressions are limited only to an unidirectional horizontal plane in the English language, whereas the Chinese language uses horizontal, vertical, and sideways metaphors for temporal expressions and characterizes the sociocultural diversity in concepts across language communities.

**Vertical temporal sequencing.** Much of the literature conceptualizes temporal relationships as a one-dimensional, horizontal plane (Clark, 1973; Scott, 1989; Traugott, 1975, 1978). Most of this literature is based on conceptions in the English language. As language specifics, there are more complex and multidimensional strategies used in languages such as Latin and Greek. Chinese is one of the languages that extensively expresses temporal concepts through the horizontal dimension as well as through the vertical plane. Because people tend to express time as a moving path based on their direct visual line—cross-linguistically, horizontal plane, *front/back* metaphors are more productive in languages. In terms of serialization, *up/down* represents another dimension of the spatial-temporal metaphor. The representation of the spatial-temporal metaphor in the vertical plane can be seen in Figure 5.

![Figure 5. Perception of Time as Up-down](image-url)

<table>
<thead>
<tr>
<th>up</th>
<th>earlier</th>
</tr>
</thead>
<tbody>
<tr>
<td>down</td>
<td>later</td>
</tr>
</tbody>
</table>
In Traugott’s analysis of the hierarchy of locatives, *up* is like *front* at eye level, which is canonical or positive (1975, 1978). On the other hand, *down* and *later/behind/down* are below or behind the direct eye line, which are considered as negative terms in respect to the conceptualization of our body parts and perceptual space. Meanwhile, the representation in Figure 1 for *up-down* can be related to gravity in physics. Every object falls freely, from top to bottom. Thus, the flow of a river can be associated with the metaphor of *front/back* or *up/down*.

In English, a large number of verbal phrases involve vertical terms as aspectual meanings. However, most of these phrases function primarily as a completive carrying very limited or no spatial value. Examples, such as *drink up/drink down, burn up/burn down, act up*, and *eat up*, are in the state of completion. These expressions of *up* in verb phrases lack serialization. In addition, *down* seems to develop independently, which occasionally represents a physical expression of vertical space, which is different from *up* as the state of the action as in Example (14) (Traugott, 1975, 1978).

(14) a. We worked hard *down* to the end of the year (Traugott, 1975, p. 223).

b. Hand *down* knowledge from generation to generation (Boroditsky, 2001, p. 5).

Other than a few usages of *down* in English, some other vertical expressions, such as *above/below*, for serialization, are similar to the Chinese metaphor, *shàng-wén* (‘up-text’) ‘above section’ and *xià-wén* (‘down-text’) ‘below section.’ Nevertheless, in English, vertical metaphors in the expression of time remain less systematic and ambiguous (Boroditsky, 2001; Scott, 1989; Traugott, 1975, 1978). On the other hand, Chinese has more systematic vertical terms in spatial-temporal metaphors.
Chinese conceptualization of space-time metaphors. Space is the universal property for us to speak of time across cultures and languages (Clark, 1973; Traugott, 1978). Spatial metaphors are used to organize concepts as a whole system and with respect to one another (Lakoff & Johnson, 2003). The universal property of spatial orientations arises from our physical and cultural experience based on our bodily compositions and how our body functions in relation to our physical environment (Lakoff & Johnson, 2003). As Lakoff and Johnson (2003) point out, metaphorical orientations are based on physical and cultural experience in human beings. Although the basic orientational references are physical in nature, such as up-down/front-back/in-out, the orientational metaphors are not arbitrary but vary from culture to culture (Lakoff & Johnson, 2003).

Vertical orientational metaphors. The differences in orientational metaphors between Chinese and English demonstrate that cultural experience influences the way people use orientational metaphors differently. The use of the vertical dimension as a temporal metaphor is very common in addition to the horizontal dimension in Chinese but not in English. Chinese use both horizontal orientation, qián-hou (‘front-back’), as well as vertical orientation, shàng ‘up’ and xià ‘down,’ to indicate temporal (Scott, 1989).

In Chinese, shàng/xià (‘up/down’) has equal weight with qián/hou (‘front/back’), indicating the sequence of events. However, while shàng/xià is restricted to associate with a certain time/event word, qián/hou is not.

(15) a. shàng ge xīngqī b. shàng ge yuè
    up  CL week        up  CL month
    ‘last week’         ‘last month’
As in Examples (9) and (10), Chinese perceives days and years in a horizontal plane and weeks and months in a vertical plane as Example (15). The word qián (‘front’) was used as the aspect for month in classic Chinese literature as in Example (16), although it is considered as a pragmatic error in the modern Chinese.

(16) qián yuè fúliáng măi chá qù (from Bai, Xiyi, Pipaxing)
front month Fúliáng purchase tea go
‘He went to purchase tea leaves in Fúliáng last month.’

The usages of _shàng/xià_ (‘up/down’) in expressing the relative ordering in weeks and months and qián/hoù (‘front/back’) are coherent with the representation of the calendar.

The Western calendar lists weeks in a month in a vertical order and dates in a horizontal order. There is a dearth of literature on whether the difference in vertical and horizontal planes for the spatial-temporal metaphor is influenced by the Western concept of calendar. This is an area for further exploration.

It is hypothesized that the productive metaphorical expression of _shàng/xià_ (‘up/down’) in the Chinese language originated in the concepts of the sun’s rising and setting (Li & Dai, 2004; Scott, 1989). This core concept appears in _shàng-_wǔ (‘up-noon’) ‘morning,’ _xià-_wǔ (‘down-noon’) ‘afternoon,’ and _zhōng_-_wǔ (‘mid-noon’) ‘noon.’ The Chinese characters  上 (shàng) and 下 (xià) are ideographic in origin, which indicates the objects are above and below the level, as demonstrated in Figure 6. Also, the representation is coherent with the movement and position of the sun.
Meanwhile, the lexical meaning and origin for *shàng* is ‘high.’ The sun, god and heaven—the symbols that Chinese people worship—are at the top of their world. In the cases of expressing sky or god, *shàng* (‘up’) is usually applied, such as *shàng-qióng* (‘up-elevated’) indicating *shàng-tiān* (‘up-sky’) ‘skygod’ or *shàng-dì* (‘up-emperor’) ‘god.’ The productive expressions of vertical space metaphors, the concept of worshiping god, and the importance of social hierarchy are pervasive in Chinese daily life (Li & Dai, 2004; Scott, 1989). The vertical bias also is reflected in the Chinese writing direction. Chinese is traditionally written in vertical columns running from right to left (Boroditsky, 2001).

The compound phrase *shàng/xià* (‘up/down’) carries multiple meanings that also can demonstrate the various expressions of vertical metaphors in Chinese, which are represented in Example (17).

(17) a. *shàng xià tóng yù zhĕ shèng* (from Sunzi, *Attack by Stratagem*)

Up down joint eager person victory

‘He will win whose army is animated by the same spirit throughout all its ranks’

b. *quán jiā shàng xià dōu hĕn gāō-xĭng*

whole family up down all very happy

‘Elders or youngsters, everyone in the family is cheerful.’

c. *tāmen de shí-lĭ bù fēn shàng xià*

3pl. POSS ability not distinguish up down
‘They are at the same level.’

d. tā jīn nián wǔ-shí shàng xià
3sg current year 50 up down
‘He is about 50 years old this year.’

e. qǐng kàn shàng xià wén
please see up down text
‘Please refer to the texts above and below.’

The first metaphor is for social status as in (17a), which is the same expression as shàng-xià-qí-xīn (‘up-down-joint-heart’), ‘on the same page,’ and quán-guó-shàng-xià (‘whole-country-up-down’), ‘every individual in the nation.’ (be sure my commas in previous sentence are correct) The use of shàng-xià indicates people with different status who are in the same community group. Except for indicating space, the space term, the directional verb Shàng (‘up’), is used extensively for expressing superiority and xià (‘down’) as inferiority. The extensive vertical asymmetric metaphors include shàng-jí (‘up-grade’) ‘superior’ versus xià-jí (‘down-grade’) ‘inferior,’ shàng-cè (‘up-plan’) ‘a good plan’ versus xià-cè (‘down-plan’) ‘a bad plan,’ shàng-bào (‘up-report’) ‘to report’ versus xià-líng (‘down-direct’) ‘to give order.’ (be sure all of our punctuation in previous sentence is correct)

The second metaphor as in Example (17b) indicates the differences in generation. This concept also can be revealed from the presentation of family trees. The order of demonstrating the different generations is from top to bottom, from older to younger generations. The third metaphor in Example (17) is the expression of relative superiority or inferiority in terms of abilities. As in Example (17d), shàng/xià (‘up/down’) is the
approximate measurement, which is similar to *more-or-less* in English. I will discuss further this aspect in the following section. The final example in Example (17) indicates the ordering relationship in the text, which is similar to *above* and *below* in English, such as ‘see the paragraph *below*’ and ‘the example demonstrated *above*.’

The examples in (17) demonstrate the co-occurrence of the spatial term *shàng/xià* (‘up/down’) in metaphorical expressions of ordering in status and time. The expressions for serialization of generation (17b), time measurement (17d), and the text (17e) represent the relative ordering in space. These vertical metaphors in temporal expressions can be conceptualized by time as river movement (Li & Dai, 2004).

Time as a moving path is like the movement of water, flowing down from up. There is a productive usage for *shàng/xià* (‘up/down’) to indicate serialization in time. *Shàng* (‘up’) is always used for earlier events, while *xià* (‘up’) is used for later events. These expressions are commonly used in time terms, such as:

- *shàng-*wǔ ‘morning’ vs. *xià-*wǔ ‘afternoon,’
- *shàng*-xīngqí (‘up-week’) ‘last week’ vs. *xià*-xīngqí (‘down-week’) ‘next week,’
- *shàng*-ge-yuè (‘up-CL-month’) ‘last month’ vs. *xià*-ge-yuè (‘down-CL-month’) ‘next month,’
- *shàng*-xué-qí (‘up-learning-period’) ‘last semester’ vs. *xià*-xué-qí (‘down-leaning-period’) ‘next semester,’
- *shàng*-bèizi (‘up-life’) ‘previous existence’ vs. *xià*-bèizi (‘down-life’) ‘future existence’
Meanwhile, *shàng/xià* (‘up/down’) also can express the initial and end of the events, such as *shàng-kè* (‘up-lesson’) ‘class begin’ vs. *xià-kè* (‘down-lesson’) ‘class dismiss,’ and *shàng-bān* (‘up-work’) ‘go to work’ vs. *xià-bān* (‘down-work’) ‘finish working.’

**Sideways.** As illustrated, *front/back* metaphorical expressions for *before/after* ordering is basic to serialization across languages. *Up/down* metaphors are less common in English but are productive in Chinese language use. All of the illustrations above represent serialization ordering in time. However, it is possible to have the expression of co-occurrence in languages. When events co-occur, they are likely thought of as side by side (Traugott, 1975).

In Chinese, spatial terms together in various dimensions are used to express approximate time. These terms are “asymmetric path,” such as *zuō-yòu* (‘left-right’), *qian-hoù* (‘front-back’), and *shàng-xià* (‘up-down’). The words *zuō* and *yòu* (‘left’ and ‘right’) are not like *qian* and *hoù* (‘front’ and ‘back’), or *shàng* and *xià* (‘up’ and ‘down’), which cannot be used as separate temporal terms. Spatial terms, *zuō* and *yòu* can be expressed only as estimation for approximate measurement when they are used together. In English, there is no sideways expression for temporal relations. Although *aside* and *beside* can be used to indicate serialization that is not related, in most cases, they are logical rather than temporal terms (Traugott, 1975). In other words, *aside* or *beside* never indicate co-occurrence.

**Summary.** Based on the projection of the human body or imagined bodies of any object, the use of *front/back* and *up/down* as spatial-temporal metaphors is common in world languages (Biq, Tai, & Thompson, 1996; Tai, 1987). However, to a certain extent there are variations in expressing spatial-temporal metaphors among speech communities.
Language variations in spatial expression and temporal sequencing in both Chinese and English, such as differences in using horizontal, vertical, or even sideways paths, are in association with the development of concepts among different language communities. For instance, the productivity of vertical metaphors in Chinese daily life is closely related to the Chinese perception of the world. The Chinese society is constructed hierarchically by social status, family, and belief systems. This demonstrates that although all languages have similar lexicons at the basic level to express the world around them, some variations in structures and linguistic typologies are closely related to the physical world, human perception, and linguistic structure within a particular language society (Biq, Tai, & Thompson, 1996).

Linguistic variation in spatial-temporal metaphors demonstrates sociocultural diversity among different linguistic communities. The specific language use of vertical and sideway metaphors in temporal expressions in Chinese demonstrates habitual language uses, which reflect speakers’ thought and culture (Boroditsky, 2001). Although numerous studies have been conducted in discussing spatial and temporal metaphors cross-linguistically, few have been done to apply the assumption of conceptual influences in SLA and language pedagogy (Xing, 2000).

How do language variations affect learner’s language and thought during their second language acquisition processes? In order to study the cognitive and sociocultural aspects of SLA, this dissertation relies on both Whorfian and Vygotskian frameworks to study L2 learners’ conceptual development in the SLA process across proficiency levels, by applying Vygotsky’s and Slobin’s approaches to understand how L1 habitual language use influences L2 thinking.
Thought and Language

As Evans and Levinson (2009) state, world languages are fundamentally different from one another, and it is hard to find a shared structural property. Therefore, a study of SLA should recognize the existence of structural differences in languages and to acknowledge the diverse properties in languages (Evans & Levinson, 2009). The center of Evans and Levinson’s study (2009) is to employ cognitive and social-cultural perspectives to explore the relationship between language and thought and to further study conceptual development in SLA.

Current studies in the areas of thought and language have their roots in the 1800s with Wilhelm Von Humboldt, who believed that language is the basis of thought and that the structure of language gives rise to the organization of thought. In this century, the most influential (and controversial) formulation of the view that language to a considerable extent shapes thought is the (do not ital) Sapir-Whorf Hypothesis. From the cognitive and anthropological linguistic perspectives, the concept of a (do not ital. from here down, I will write ‘no ital’ to mean ‘do not ital’) worldview resides in every language and influences speakers’ use of that particular language, which is known as the(no ital) linguistic relativity hypothesis (LRH) (Nuyts & Pederson, 1997; Slobin, 1993).

In developmental psychology, Piaget’s theory of cognitive development assumes that the acquisition of language is dependent on conceptual development (Nuyts & Pederson, 1997). As a psychologist and social constructivist, Vygotsky (1987) laid the foundation for the interactionist’s view of language acquisition and proposed the integration of thought and language.
From different approaches, both Whorf and Vygotsky had looked at language as a tool for the formation of concepts in social and cultural environments: Vygotsky claims that language is a social concept. It requires a reciprocal process of thought and social processes to develop in the child. According to Vygotsky (1987), language acquisition is an interdependent process of growth between thought and language, and language shapes thought and vice versa within an individual and in society. Thought and language are inter-related. Whorf emphasized that language shapes thought; Vygotsky’s most important contribution concerns the inter-relationship of language development and thought (1987). As some researchers contend, Whorf’s ideas to some degree are considered a possible extension of Vygotsky’s thought, although it was not known whether Whorf read Vygotsky’s work (Lee, 1996; Lucy & Wertsch, 1987). Whorf and Vygotsky had different approaches to investigate perspectives on thought and language: Whorf took a cross-linguistic approach, and Vygotsky took a psychological and sociocultural point of view. Vygotsky’s and Whorf’s different approaches to the study of thought and language are important in studying SLA, which will be discussed further in the following sections.

**Linguistic relativity hypothesis (LHR).** The main assumption of LRH (I do not know if there is a rule, but I suggest that you not introduce the acronym in the header. Instead, introduce it in the text. If you agree, please make the change) is that the examination of cross-language variation through the analysis of formal language structure and the variation of language use reveal various cognitive processes of language use among different speech communities (Lucy, 1992a). Because of the biological and environmental constraints that affect all people in the same way, we find similar
categories in world languages (e.g., Bowerman, 1996). However, researchers of LRH (e.g., Gumperz, 1996; Levinson, 1997; Lucy, 1997; Slobin, 1996) believe that although there are similarities in meanings in languages, each language is culturally specific based on the evidence that individuals’ thinking differs across linguistic communities according to the language they speak. The structure of lexicon in one language influences the way speakers of that community perceive and conceptualize the world in a way that is different from another linguistic community (Lucy, 1992a). Also, LRH contends that even though human languages share linguistic universally, we find large differences in syntax and lexicon and the way experience is conceptualized.

**Historical review of linguistic relativity hypothesis.** The idea that different languages foster different ‘worldviews’ (Weltanschauungen) in their speakers was introduced by Wilhelm Von Humbolt in the 18th century in his work on German romanticism (Lee, 1996). Boas continued Humboldt’s tradition of integrating linguistic, ethnographic, and “naturalist” sciences, which stressed holistic and diverse perspectives in languages and cultures (Lucy, 1992a).

Boas’s primary student in linguistics, Edward Sapir, extended Boas’s study and reversed his claim that “linguistic classifications reflect thought and argues rather that organized linguistic classifications channel thought” (Lucy, 1992a, p.19). In Sapir’s later work, he emphasizes language as a formally complete symbolic system, a powerful tool in shaping thought in the interpretation of experience, because he claims that the notion of culture involving shared symbolic understanding leads to the interest of connecting the relationship between language and thought (Lucy, 1992a). As Sapir (2010) contends, individuals live in a social world where language has become the medium of expression.
for their society. Sapir also claims that is an illusion to adjust to reality without the use of language (2010). Sapir’s most significant contribution is to pattern linguistic data (Lee, 1996). Sapir is particularly interested in the fact that grammatical patterning can be derived from a language, and he claims that this pattern demonstrates the fact that individuals are not aware of their participation in cultural patterns (Lee, 1996).

Whorf advanced the assumptions regarding the linguistic analysis of experience and concepts developed by Boas and Sapir. His primary contribution was to move beyond the comparison of isolated sentences from different languages. From comparing the habitual speech patterns by constructing and interpreting the analogical structures of distinctive languages, Whorf suggested that the interpretation of experience can be traced to grammatical structures. Whorf’s research compares the form-meaning correspondences in two languages and then examines the connections between those correspondences and habitual thought in various cultural beliefs (Lucy, 1997). He considered the characteristic meaning structure as a whole rather than studying the grammatical structure itself (Lucy, 1992a, 1992b).

Whorf not only transforms Sapir’s preliminary statement, habitual speech, but also introduces the first evidence of the statement from his effective empirical investigations (Lucy, 1997). Whorf writes that language initiates the exploration and investigation of reality as the main conceptual and concrete tool an individual has at their disposal. By contrasting Hopi and English language patterns, Whorf suggests that Hopi culture embedded different conceptualizations than English. To define the assumption of “worldviews,” Whorf based his comparative study on Hopi and English linguistic and
cultural patterns and concluded that experience embedded in language is an integrated "fashion of speaking" (Whorf, 1956 cited in Lucy, 1997):

Concepts of “time” and “matter” are not given in substantially the same form by experience to all men but depend on the nature of the language or languages through the use of which they have been developed. They do not develop such upon ANY ONE SYSTEM (e.g., tense, or nouns) within the grammar as upon the ways of analyzing and reporting experience which have become fixed in the language as integrated “fashions of speaking” which cut across the typical grammatical classifications, so that such a “fashion” may include lexical, morphological, syntactical, and otherwise systematically diverse means coordinated in a certain frame of consistency (p. 158; his emphasis).

Whorf’s idea, fashion of speaking, usually is misinterpreted by researchers. It is commonly misunderstood as the potential language use that people are capable of using or not using. Indeed, fashion of speaking indicates the language form that people usually use within their speech communities. Among others, Slobin’s (1996) “thinking for speaking” is one form of human thinking. This view, which is the closest to Whorf’s conception that fashion of speaking determines habitual thought, will be discussed more in the next section.

Lucy (1992b) summarized Whorf’s formulation that the configurations of grammar frame conceptual systems in language speakers, which result in construal of experience, cultural practice, and beliefs. This formulation is illustrated in Figure 7 (Lucy, 1992b, p. 64).
Lucy (1992a) reviews the two basic arguments that emerged from Whorf’s study of language, thought, and culture. First, Whorf uses the term *linguistic analogy* to indicate the linguistic nature of groupings of different aspects of reality. Second, he argues that linguistic analogies, which are the guidelines for interpreting behaviors and responding to experienced reality, exist in thought. Lee (1996) defines Whorf’s linguistic relativity: “the question of whether language in general influences thought in general, or even the broad claim that different languages shape thought differently” (p. 87).

Domain of space is one of the major focuses in LRH, because space is fundamental to human cognition, and languages provide ways to talk about spatial relations, but they do so in different ways (Gentner & Bowerman, 2009, p. 466). The forms of spatial description differ across languages, and an increasing number of studies shows more cross-linguistic variation in spatial semantic expressions (e.g., Brugman, 1984; Lakoff, 1987; MacLaury, 1989; Talmy, 1985). Hence, the spatial domain provides a perfect area for cross-linguistic comparison.

**Implications of linguistic relativity hypothesis.** Dan Slobin (1991, 1996) adopts Humboldt’s and Whorf’s worldview as residing in every language, with language as the formative instrument of thought. People express their experiences and perceptions of the world through particular language structures. Slobin (1991, 1996) proposed to use the framework “thinking for speaking” because not everything happening every day could be
associated with the world, such as the distinctive utterances indicating the same event “she went to work” vs. “she has gone to work”; or the indication of the same object, but with distinctive articles, such as “a car” vs. “the car.” He argues that these distinctions of linguistic items can be learned only through language.

Slobin argues that the mental process formed during utterances involves dynamic activities (1996). Thus, he proposes to replace “thought and language” with the term “thinking and speaking.” Slobin’s “thinking for speaking” suggests that in acquiring a native language, we learn particular ways of thinking for speaking (Slobin, 1996). Central to Slobin’s study is the claim that “one cannot verbalize experience without taking a perspective…the language being used often favors particular perspectives” (2000, p. 107). Slobin’s dynamic view of the language process is consistent with Lee’s (1996) languaging as “the process of making meaning in a communicable way using speech and its derivatives and associated systems” (p. 76).

Slobin (1991) suggests that children who learn different languages end up with different conceptual structures and different communication patterns. Slobin’s (1991) study focuses on comparing form and function. He proposes that the grammatical systems carry meanings, which are more general compared to the specific contents of lexical items. Slobin (1991) further points out that all specific lexical content is embedded as grammatical meanings, and the specific content is sorted in a particular sentence structure, which might carry temporal and spatial relations, modality, voice, illocution, etc. Slobin (1991) argues that one’s utterances reflect one’s thoughts. That is, during the activity of speaking, one fits one’s thinking process into available linguistic
structures. For instance, if there is no use of tense in a language, the speaker will rely on aspects to express temporal events (Traugott, 1978).

Each native language trains its speakers to pay attention differently to experiences while talking about real-world objects or concepts. Once our minds have been trained in taking a particular viewpoint while speaking, it is especially difficult to be reconditioned. This training of language use is carried out through childhood and is particularly resistant to adult L2 acquisition.

To examine this “thinking for speaking” process, Slobin conducted a systematic study comparing children of speakers in several languages while describing several scenes with the expressions of temporal and spatial relations. This cross-linguistic study of narrative development involves native speakers of English, German, Hebrew, Icelandic, Japanese, Mandarin, Russian, Spanish, and Turkish. In acquiring each of these languages, children are guided by the set of grammaticized distinctions in the language to attend to such features of events while speaking. Slobin and his colleagues’ (1991) study demonstrates the development of rhetorical style in each of the languages, which reflect the language-specific patterns of thinking for speaking in these preschoolers. Their study intends to demonstrate that in the verb-framed languages (V-languages), such as Italian and Spanish, there are more adverbial usages in describing an event because the path of motion is encoded in the main verbs (Talmy, 1985). In contrast, in the satellite-languages (S-languages), such as English and Chinese, there are more descriptions of tracking an activity. These differences in speech styles revealed the diversity of tense/aspect forms across languages because the path of motion is encoded by an element associated with the main verb (Talmy, 1985).
(18) a. Jean est entré dans la maison (en courant).
John be into in the house (in running)
b. John ran into the house.

FIGURE MOTION+MANNER PATH GOAL

Example (18a) (Sugiyama, 2005, p. 299) illustrated that the path has been described by the satellite into, and the main verb encodes motion that the figure, John, is moving across the boundary and reaches the goal. By contrast, (18b) illustrates that French, a V-language, the main verb, entré, describes motion and the path of the activity.

A salient finding from Slobin and his colleagues’ (1991) study--across various story episodes and languages--suggests that grammatical categories that exist in the native language are expressed by children, whereas those that are omitted in the native language are ignored. The finding demonstrates that the systems, in particular, second languages, are especially difficult to master for speakers of particular first languages. For instance, it is particularly difficult for speakers of a language that lacks a plural marker to master the category of plurality in a second language due to this covert nonlinguistic feature in the L1 that is an overt grammatical category in the L2.

From the findings of the study, Slobin (1996) further proposes “first-language thinking in second-language speaking.” The perspective that children constrain their sensitivity to what Sapir called “the possible contents of experiences as experienced in linguistic terms” during their language-learning process articulates the limitation of acquiring the particular language structures in their L2 because of the influence by their L1 categories (Slobin, 1996). For instance, it is hard for Chinese speakers to comprehend gender or plurality markers while learning the European languages, because only rarely
are gender and plurality marked in the Chinese language. The same thing applies to tense, because there is no tense in the Chinese language. L2 English learners require tremendous practice to be fluent in the tense markers while speaking English. Hence, the speakers of each native language are conditioned to pay different kinds of attention to grammatical categories from their childhoods, and this training is extremely resistant to restructuring in SLA, especially in their adulthood (Slobin, 1996).

Slobin’s study elicits natural speech under a controlled setting, which allows him to examine how different language groups of speakers interpret the same event in the story. To examine how language construes reality can reflect differences in the formation of habitual thought among different languages. Many cross-linguistic studies (i.e., Gentner & Bowerman, 2009; Guo, J., & Lieven, E., 2009) of L2 can involve the investigation of Slobin’s ‘thinking for speaking’ hypothesis. The systematic analysis of particular structural systems in the L2 that speakers of particular L1s find especially difficult to comprehend can demonstrate the process of L1 thinking in L2 speaking. A study from the European Science Foundation team investigated the second-language acquisition process in adult immigrants of Italian and Punjabi speakers (Bhardwaj, Dietrich, & Noyau, 1988).

The cross-linguistic data from these Italian and Punjabi immigrants focuses on the analyses of the domains of time and space. The data suggests that from the aspect of the domain of time, Italian and English are tense-prominent languages, according to the deictic relation to the moment of speaking. Therefore, Italian immigrants are comfortable using past-tense forms in English discourse. It is very natural for Italian speakers to contrast past events, from the present from an external perspective, even when they are
contextualizing the English narratives. Italian speakers tend to use more tense marking than the progressive aspect. Like many Asian languages, Punjabi is an aspect-prominent language. It is well known that the three primary axes of deictic reference—PERSON, SPATIAL, and TEMPORAL—cannot be not separated in the discourse (Herman Parret, 1985, cited in Bhardwaj, et al., 1988). In many world languages, especially in South Asian or Southeastern Asian cultures, the expression of actor-orienting and spatializing of time in storytelling is common (Bhardwaj et al., 1988). Bhardwaj and her colleagues’ data show that Punjabi speakers project themselves not only in the narratives but also imaginatively transform themselves spatiotemporally while narrating a story. This phenomenon was most notable when Punjabi speakers acquire English, as they are very likely to overgenerate English progressive markers to narrative events, such as my wife telling the doctor, when we coming here, I thinking before (Bhardwaj et al., 1988, pp. 45-49).

The data also show that Punjabi speakers’ English acquisition in the domain of space is strongly influenced by their native language. Locatives in Punjabi language are considered as region nouns, such as at the back of the door and on the bottom of the desk (Bhardwaj et al., 1988). Therefore, when Punjabi speakers indicate locations in English, they tend to treat prepositions as nouns as well. For instance, Punjabi speakers would say put the down chair and pull the up. Meanwhile, the data demonstrate that Punjabi speakers transfer the concept of considering states as the results of the processes into English.

Based on this study, the European Science Foundation team concludes that the SLA process reflects the influence of the lexico-grammatical systems of both L1 and L2
(Bhardwaj et al., 1988, p. 86). They suggest that adult L2 learners try to discover a system in the L2 that is similar to the one in their L1, and if they cannot discover any, they will try to create one. Thus, there is a new system consisting of subsystems that are created by L2 learners, which is based on the materials in L2 and is an integration of some features of both parent systems in both languages. This new system often is independent from one or another language system.

Based on this assumption, we can explain why it is very hard for English speakers to grasp the Spanish perfective/imperfective distinction, which is lacking in English (Bhardwaj et al., 1988). On the other hand, native French speakers are ready to acquire the Spanish imperfective, because they have a similar category in French; but the progressive and perfect expressions are problematic to them because they are not encoded in the grammatical system of French. All of these examples demonstrate that each native language has conditioned its speakers to pay various types of attention and is exceptionally resistant in adult SLA (Slobin, 1996).

**Slobin’s L1 thinking in L2 speaking.** Slobin (1991, 1996) adopts Humbolt’s and Whorf’s worldview as residing in every language, which thus views language as the formative instrument of thought. People express their experience and perception dealing with the world through a particular language structure. Slobin’s *thinking for speaking* suggests that in acquiring a native language, we learn particular ways of thinking for speaking (Slobin, 1996). Central to Slobin’s study is the claim that “one cannot verbalize experience without taking a perspective…The language being used often favors particular perspectives” (2000, p. 107). Slobin (1991) suggests that children who learn different languages end up with different conceptual structures and different communication
patterns. Slobin’s (1991) study focuses on comparing form and function. He proposes that the grammatical systems carry meanings, which are more general compared to the specific contents of lexical items. Slobin (1991) further points out that all specific lexical content is embedded as grammatical meanings, and the specific content is sorted in a particular sentence structure, which might carry temporal and spatial relations, modality, voice, illocution, etc. Slobin (1991) argues that one’s utterances reflect one’s thoughts. That is, during the activity of speaking, one fits one’s thinking process into available linguistic structures. For instance, if there is no use of tense in a language, the speaker will rely on aspects to express temporal events (Traugott, 1978).

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**Recent studies on linguistic relativity hypothesis.** The question proposed by the linguistic relativity hypothesis, “Does a particular language shape the way its speakers perceive the world?” has led to a substantial amount of research examining how speakers of different languages talk about the world differently (Boroditsky, 2001; Minami, 2005). Among those (i.e., Lucy, 1992a, 1992b; Lee, 1996; Slobin, 1991, 1996), Berman and Slobin’s (1994) *Frog* study, which examines how a language shapes its speakers thought, inspired numerous follow-up *Frog* studies. In research using *Frog, Where Are You?*
(Mayer, 1969), the elicitation method has been conducted in 48 languages in L1 acquisition and 17 languages in SLA or bilingualism (Berman, 2009).

Linguistic relativity studies are based on the modification of typological analyses, which aim to demonstrate that generative linguistic approaches do not help to interpret cross-linguistic variables in human’s thinking processes across languages in the world (Guo & Lieven, 2009; Bowerman, 2009). As Berman (2009) comments on this approach, “constructing a narrative provides people with a compelling means for deploying their linguistic, cognitive, and pragmatic knowledge--three strands of inquiry that Slobin has consistently argued should not be treated as autonomous” (p. 121). Slobin’s investigations of narratives across languages and across lifespans also has been widely applied in studies regarding typology issues in the linguistic conceptualization of space and motion (Guo & Lieven, 2009; Berman, 2009).

Although there are substantial studies comparing the relationship between language and thought processes in speakers across languages, speakers of different languages are tested only in their native language (Boroditsky, 2001; Minami, 2005). Hence, language effect on thinking reflects only on the native language (Boroditsky, 2001). To understand the effect of L1 thinking on L2 speaking, Boroditsky (2001) used the implicit measure of reaction time in English for investigating whether speakers of English and Chinese think differently about the domain of time.

To understand the effect of L1 thinking on L2 speaking, Boroditsky (2001) used the implicit measure of reaction time in English for investigating whether speakers of English and Chinese think differently about domain of time. In the first experiment, participants were primed to answer spatial questions consisting of either horizontal or
vertical spatial scenarios with a sentence description. For instance, “March comes *before* April” versus “March comes *earlier than* April” (Boroditsky, 2001). The two groups were found to think differently about time. Native Chinese speakers tended to think about time vertically, which is a trait lacking in native English speakers. This habit in thought appears in Chinese speakers as vertical bias when thinking in English.

The second experiment in Boroditsky’s (2001) study aimed to explore the extent to which Mandarin-English bilinguals think about time vertically is related to how old they were when they began to learn English. The results show that the length of the Chinese monolingual period is highly related to the vertical bias. The final experiment in Boroditsky’s (2001) study was to alter the English speakers’ habitual thought about time horizontally and to train them to use vertical spatial terms to talk about time. They were given example sentences (e.g., “Monday is *above* Tuesday” or “Monday is *higher than* Tuesday”) and were instructed to use this “new system.” Immediately after the training, participants were given a test on a computer by responding TRUE or FALSE to vertical prime questions.

The findings of Boroditsky’s study (2001) indicate that regardless of the cultural background and orientation of spatial metaphors, the patterns of results in English speakers and Chinese speakers appear to be similar. Thus, Boroditsky (2001) suggests that different ways of talking influence different ways of thinking.

Boroditsky’s (2001) study uses spatial metaphors in relation to time expression to demonstrate that language forms are shaped by the language experience. The experimental design of language-thought correlation in the study is insightful and inspiring.
Some cross-linguistic studies test bilingual speakers through narrative elicited tasks, such as Özçalıșkan and Slobin’s (1998) narrative study in Turkish and English and Minami’s (2005) narrative study in Japanese and English. Bilingual participants in both studies told stories in both languages. One half of the participants narrated the entire story in the target language, then in English, and vice versa. While Özçalıșkan and Slobin (1998) compared story-retelling by both monolingual and bilingual speakers of Turkish, Minami (2005) compared Japanese and English narrative development with fluent bilingual speakers with the *Frog* Story.

As Minami (2005) contends, the pioneering work (e.g., Bamberg, 1987; Berman & Slobin, 1994) of using *Frog, Where Are You?* (Mayer, 1969) as a narrative discourse for studying the language acquisition process established a method in the cross-linguistic research paradigm. The approach of using the same picture book to elicit narratives from speakers of different languages allows researchers to study dynamics in language acquisition processes by analyzing cultural and linguistic systems/patterns among different groups of language speakers. However, as Minami (2005) pointed out, the use of the *Frog* story in current literature has been applied to the study of L1 acquisition. Scholarly work using this method has not been applied consistently to the study of bilingualism.

To extend the limitation of the current literature, I will study the dynamic narrative development during the process of SLA. Although researchers such as Boroditsky (2001) and Minami (2005) have done significant work on studying the thinking processes in bilingual or second language learners, there is a gap in understanding how the thinking process has been changed along the second language
learning process. To understand the dynamic process of thinking in the second language, it is crucial to study L2 learners from different acquisition stages. The following section will review Vygotsky’s formation of a system of meaning during the thinking and speaking process to fulfill this gap.

**Vygotsky’s sociocultural theory in developing thought and language.**

Vygotsky studies thought and language through the dynamic interdependence of social and individual processes (John-Steiner & Mahn, 1996). His main contribution is to use an analytical approach to study the formation of thinking and speaking processes in the human mind by observing the interaction of natural, social, and individual forces leading to the acquisition of mental consciousness (Mahn, 2010).

Researchers apply Vygotsky’s experimental and qualitative approach to examine students’ processes of internalization (John-Steiner & Mahn, 1996). He analyzes children’s experience of developing meaning in their sociocultural world by observing their perception, memory, attention, motivation, and emotion (Vygotsky, 1987; Mahn, 2012a). He is particularly interested in the qualitative analysis of the development in children’s thinking conceptually and the understanding of social, linguistic, cultural, logical, and emotional systems (Vygotsky, 1987). This approach also can be applied to the area of foreign language acquisition (Mahn, 2012b).

First, Vygotsky’s sociocultural approach adds an important perspective to valuing cultural variation and its inter-relation with development, which are distinguished from the universal view of language (John-Steiner & Mahn, 1996). His work on the inter-relationship of individual and social activity in meaning-making processes in individuals leads to the recognition of the diversity of culture, languages, and individual differences,
such as prior experiences and learning styles. This sensitivity of cultural and linguistic diversity is an important aspect to the study of language acquisition in different communities.

Vygotsky’s sociocultural theory examines the variety of language development, both within and between cultures, which shapes and impacts one’s learning experience (John-Steiner & Mahn, 1996; Vygotsky, 1987). Researchers (i.e., John-Steiner, 1985) apply Vygotsky’s sociocultural approaches to cross-cultural comparison studies of teaching and learning in indigenous communities. Two exceptions are Tharp and Gallimore’s (1988) work, which illustrated the narrative style difference in Hawaiian children; Jordan, Tharp, and Vogt’s (1985) comparison study in another indigenous context; Navajo children (John-Steiner, 1985). Another cross-cultural research by John-Steiner (1985) demonstrated the importance of identifying the various artifacts and learning styles in Native American students’ traditions, which is in contrast to the school setting of Western culture. Few scholars (i.e., Mahn, 2012) conducted empirical studies in cross-linguistic learning experiences in L2 learners with the support of Vygotsky’s sociocultural approaches.

Second, Vygotsky’s sociocultural approach suggests that conceptual thinking develops through verbal thinking, internalization, and generalization of a system of meaning through the dynamic interdependent process of individual and social-cultural activities (Mahn, 2012; Vygotsky, 1987). To acquire a word at the initial stage of language acquisition, language learners tend to acquire a word by its external meaning. The dynamic socialization process is the main unification entity to facilitate language learners’ development of stable and systematic concepts in word use (Mahn, 2012a).
Vygotsky’s sociocultural approach provides the main theoretical and methodological framework studies in L1 acquisition acquiring the native language. Vygotsky (1987) also suggests that the nature of L2 acquisition is different from L1 acquisition. Acquiring a second language, especially a foreign language, is not likely to involve the same circumstance as acquiring the native language. Foreign language learners’ lack of immersion in communicative experience with the target-language society can explain the barriers that occur linguistically and culturally during SLA.

Vygotsky (1987) suggests that one learns a foreign language in school differently from learning a native language:

The development of the native language begins with the free and spontaneous use of speech and ends with conscious awareness and mastery of the speech forms. In contrast, the development of the foreign language begins with conscious awareness and volitional mastery of language and culminates in free, spontaneous speech (Vygotsky, 1987, p. 221).

While a child acquires a native language, its more complex forms are used before the development of conscious awareness of the linguistic and grammatical rules. In a foreign language, the acquisition sequence is the opposite. The rules of higher and complex forms of speech are introduced prior to the learner becoming comfortable with using the language in real contexts. This means that conscious awareness and intention develop earlier in L2 learners, and spontaneous use of speech develops later in L2 learners.

The differences in the development of speech and written language are similar to differences in the development of native and foreign languages as well. For instance, it is common to become significantly more advanced in verbal speech than in written
performance in one’s native language. In contrast, one starts to learn a foreign language at school, and written skills often may be more advanced than oral language skills, due to different stages of development between the two (e.g., Vygotsky, 1987; Lantolf, 2000).

The fact that learning a foreign language in school differs from learning a native language is similar to how learning scientific concepts differs from learning everyday concepts. Vygotsky points out that learning a second language involves conscious awareness, and L2 learners consequently become more aware of their native language (John-Steiner, Meehan & Mahn, 1998). Furthermore, L2 learners’ systems of meaning originally developed through everyday concepts in their native languages. Based on these assumptions, if individuals already possess a system of meaning in their native language when one starts to learn a foreign language, this system of meaning influences the foreign/second language (Vygotsky, 1987).

To examine this complex process of developing a system of meaning in L2, the findings of John-Steiner’s (1985) study of “The Road to Competence in an Alien Land,” based on research with immigrants acquiring a new language, suggest that novice speakers rely heavily on their native language as the main channel of their thinking processes at the early phases of SLA; as they progress in SLA, there are two process at work (John-Steiner, 1985). First, there is a separated process in L1 and L2 at the phonological and syntactic levels with the evidence of fewer and fewer interference errors from L1 to L2. Second, there is a unification process at the semantic level, which is a complex and inter-related process. (John-Steiner, 1985).

This finding suggests that the development of meaning in a new language is the most difficult element to distinguish, and the unification of system of meaning within L1
and L2 can be carried even to the later stage of SLA. Vygotsky’s dialectical approach can be applied in this case to explain where and how these trajectories become unified or inter-related and how processes of knowledge are constructed (John-Steiner, 1985).

**Implications in SLA.** With increasing attention on the diversity of sociocultural factors in language acquisition, there is widespread interest in investigating L1 influence on SLA. Applying the linguistic relativity hypothesis in the field of SLA will enrich the understanding of thinking processes in L2 learners by comparing and contrasting different linguistic structures, such as the domain of space, in their L1 and L2. By comparing and contrasting cross-linguistic patterns of use, diversity in habitual thoughts across different language populations will be identified. This diversity will benefit the understanding of L2 learners’ barriers in the process of SLA.

Vygotsky’s dialectical approach provides a practical methodology for studying thinking and speaking processes. For the purpose of my study, exploring the development of pragmatic language use of spatial and temporal expressions in L2, Vygotsky’s analysis of the verbal thinking process and the development of a system of meaning are key to decontextualizing this highly complex process. Only through this qualitative ontogenetic approach can the developmental path of thinking and speaking interrelationships be studied.

Studying language diversity via spatial and temporal expressions will contribute to the gaps in L2 pedagogical studies in several ways. Although space is the basic domain for humans to express the temporal in world languages, speakers express temporal systems and spatial metaphors differently from language to language. The developmental path of human mind is critical in SLA, but it is usually ignored in current L2 studies. It
will be especially critical to understand to what extent the target language and the native language are different for a second language learner.

Meanwhile, understanding how language shapes the way speakers perceive the world differently can provide language educators a guideline to help language learners conceptualize the usage of temporal sequencing and spatial metaphors in the target language. In other words, the understanding of cross-linguistic concepts might minimize first-language interference and benefit students’ efficiency in language acquisition. If L2 instructors have the awareness and knowledge in cross-linguistic and cross-cultural variations, they can facilitate students’ second-language learning more efficiently.
Chapter 3
Methodology

Research Design

Several empirical studies have investigated the linguistic relativity hypothesis in second language (L2) speakers. Berman and Slobin’s (1994) *Frog Story* study has become a paradigm for numerous studies testing the linguistic relativity hypothesis in second language acquisition across different language communities. Their methodology generates qualitative data that can be analyzed with respect to the linguistic relativity hypothesis. Boroditsky (2001), by contrast, conducted an experimental study using a different paradigm with Chinese speakers and English speakers to investigate the linguistic relativity hypothesis by comparing their response time and accuracy rates to horizontal and vertical primes.

The purpose of my study is to investigate conceptual development in L2 learners. Hence, I examined the qualitative changes in L2 learners’ speaking as they relate to their temporal sequencing and spatial metaphor by expanding on Berman and Slobin’s (1994) and Boroditsky’s (2001) studies. I applied the protocol in Berman and Slobin’s (1994) *Frog Story* study for the collection of naturalistic language data. Although I tested the linguistic relativity hypothesis in Chinese and English language speakers from the same scope of spatial referencing, testing differences between vertical and horizontal references, as in Boroditsky’s (2001) study, I was more interested in investigating the developmental stages and first language (L1) habitual use in L2 thinking and speaking processes by studying naturalistic language use in L2 learners.
I used mixed methods in my dissertation. First, I conducted statistical analyses on the usages of spatial referents between Chinese and English speakers. Then, data analysis was based primarily on discourse analysis, which utilized the statistical findings to descriptive analysis. Data were collected via storytelling. Based on the protocol in Berman and Slobin’s (1994) *Frog Story* study, I expanded on their study by utilizing cross-linguistic and cross-proficiency-leveled experimental design and discourse analysis, which allowed me to test the variety and changes of spatial concepts among different language groups.

The purpose of this study was to explore the differences in conceptualizing time and space at various dimensions cross-linguistically. Because the Chinese language comprises more dimensional referents to indicate time than English does, I hypothesized that Chinese language learners who are native English speakers experience more difficulties while expressing temporal concepts in Chinese. My study examined three-dimensional space and time usages between Chinese language learners (CLLs) and English language learners (ELLs) and among language learners at various proficiency levels. The comparisons of different usages of time and space suggest how L2 was influenced by L1.

A 2 language X 5 proficiency level X 6 spatial category factorial design was the main experimental design for my data collection. The dependent variables in my dissertation are the relative frequency usages of spatial terms referencing space and time in six categories: horizontal-physical referents, vertical-physical referents, sideways-physical referents, horizontal-temporal referents, vertical-temporal referents, and sideways-temporal referents. More analysis of variance (ANOVA) tests were conducted
to study various levels of frequencies among language groups. The independent variables were (a) type of language, (b) language proficiency level, and (c) types of stories. Respective levels of independent variables were (a) native versus second language; (b) beginning, intermediate, advanced, and native speakers; and (c) two wordless picture books.

Participants

Twenty-one CLLs and 20 ELLs, with varying degrees of experience with Chinese and English, participated in this study. All of the CLLs were native English speakers, while all of the ELLs were native Chinese speakers. To have the least variation in their native languages, the English language learners were limited to those originally from Taiwan, whereas all of the Chinese language learners were from the American Southwest. The participants were monetarily compensated for their time participating in the narrative tasks. Chinese language learners ranged in age from 17 to 60 (M = 35 years, SD = 11.9 years), and English language learners ranged in age from 17 to 53 (M = 28.3 years, SD = 10.5 years).

Most participants were recruited from Albuquerque, N.M. Major recruitments took place at the University of New Mexico (UNM). Recruitment flyers were sent to the Chinese language program and to the Center for English Language and American Culture (CELAC), which is an intense English language program for international students at UNM; flyers were posted on campus and were circulated among the Taiwanese community in Albuquerque. Prior to identifying eligibility for participating in this study, I had at least 10 minutes of either face-to-face, phone, or Skype conversation with potential participants, code-switching in both Chinese and English to glean general
background information of their language learning experiences. Potentially eligible individuals were identified, and those who agreed to participate were given a consent form (Appendix 2) and a language background survey (Appendix 3). Four proficiency levels were identified in each group of language learners: low intermediate, intermediate, advanced, and nativelike, as shown in Table 1.

<table>
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<tr>
<th>Table 1. Second Language Proficiency Level Groups</th>
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<tr>
<td>Low-intermediate</td>
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<td>English language learners</td>
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<td>Chinese language learners</td>
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Further demographic information is listed in Figure 4.

The proficiency levels were defined by general *American Council on the Teaching of Foreign Languages* (ACTFL) proficiency guidelines--speaking. If participants’ English speaking proficiency met a level of intermediate low, intermediate high, advance mid, or superior level, according to ACTFL guidelines, they were classified into a low intermediate, intermediate, advanced, or nativelike English language group, respectively.

Table 2 highlights the tasks that speakers can handle, as well as the content, context, accuracy, and discourse types represented in the speech at each proficiency level of English language learners.

<table>
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<th>Table 2. ACTFL Proficiency Guidelines 2012 – Speaking</th>
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<td>English language learners: Superior</td>
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| Speakers at the superior level are able to communicate with accuracy and fluency in order to participate fully and effectively in conversations on a variety of topics in formal and informal settings from both concrete and abstract perspectives. They discuss their interests and special fields of competence, explain complex matters in detail, and provide lengthy and
coherent narrations, all with ease, fluency, and accuracy. They present their opinions on a number of issues of interest to them, such as social and political issues, and they provide structured arguments to support these opinions. They are able to construct and develop hypotheses to explore alternative possibilities.

When appropriate, these speakers use extended discourse without unnaturally lengthy hesitation to make their point, even when engaged in abstract elaborations. Such discourse, while coherent, still may be influenced by language patterns other than those of the target language. Superior-level speakers employ a variety of interactive and discourse strategies, such as turn-taking and separating main ideas from supporting information through the use of syntactic, lexical, and phonetic devices.

Speakers at the superior level demonstrate no pattern of error in the use of basic structures, although they may make sporadic errors, particularly in low-frequency structures and in complex high-frequency structures. Such errors, if they do occur, do not distract the native interlocutor or interfere with communication.

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<th>English language learners: Advanced mid</th>
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<td><strong>Advanced mid</strong></td>
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<td>Speakers at the advanced mid sublevel are able to handle with ease and confidence a large number of communicative tasks. They participate actively in most informal and some formal exchanges on a variety of concrete topics relating to work, school, home, and leisure activities, as well as on topics relating to events of current, public, and personal interest or individual relevance.</td>
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<td>Advanced mid speakers demonstrate the ability to narrate and describe in the major time frames of past, present, and future by providing a full account, with good control of aspect. Narration and description tend to be combined and interwoven to relate relevant and supporting facts in connected, paragraph-length discourse.</td>
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<td>Advanced mid speakers can handle successfully and with relative ease the linguistic challenges presented by a complication or unexpected turn of events that occurs within the context of a routine situation or communicative task with which they otherwise are familiar. Communicative strategies such as circumlocution or rephrasing often are employed for this purpose.</td>
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<tr>
<td>The speech of advanced mid speakers performing advanced-level tasks is marked by substantial flow. Their vocabulary is fairly extensive although primarily generic in nature, except in the case of a particular area of specialization or interest. Their discourse still may reflect the oral paragraph structure of their own language rather than that of the target language.</td>
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<tr>
<td>Advanced mid speakers contribute to conversations on a variety of familiar topics, dealt with concretely, with much accuracy, clarity and</td>
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</table>
precision, and they convey their intended message without misrepresentation or confusion. They are readily understood by native speakers unaccustomed to dealing with non-natives. When called on to perform functions or handle topics associated with the superior level, the quality and/or quantity of their speech generally will decline.

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<th>English language learners:</th>
<th>Intermediate high</th>
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<td>Intermediate</td>
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| Intermediate high speakers are able to converse with ease and confidence when dealing with the routine tasks and social situations of the intermediate level. They are able to handle successfully uncomplicated tasks and social situations requiring an exchange of basic information related to their work, school, recreation, particular interests, and areas of competence. Intermediate high speakers can handle a substantial number of tasks associated with the advanced level, but they are unable to sustain performance of all of these tasks all of the time. Intermediate high speakers can narrate and describe in all major time frames using connected discourse of paragraph length but not all the time. Typically, when intermediate high speakers attempt to perform advanced-level tasks, their speech exhibits one or more features of breakdown, such as a failure to carry out fully the narration or description in the appropriate major time frame, an inability to maintain paragraph-length discourse, or a reduction in breadth and appropriateness of vocabulary. Intermediate high speakers generally can be understood by native speakers unaccustomed to dealing with non-natives, although interference from another language may be evident (e.g., use of code-switching, false cognates, literal translations), and a pattern of gaps in communication may occur.

<table>
<thead>
<tr>
<th>English language learners:</th>
<th>Intermediate low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low intermediate</td>
<td></td>
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</table>
| Speakers at the intermediate low sublevel are able to handle successfully a limited number of uncomplicated communicative tasks by creating with the language in straightforward social situations. Conversation is restricted to some of the concrete exchanges and predictable topics necessary for survival in the target-language culture. These topics relate to basic personal information; for example, self and family, some daily activities and personal preferences, and some immediate needs, such as ordering food and making simple purchases. At the intermediate low sublevel, speakers are primarily reactive and struggle to answer direct questions or requests for information. They also are able to ask a few appropriate questions. Intermediate low speakers manage to sustain the functions of the intermediate level, although barely. Intermediate low speakers express personal meaning by combining and recombining what they know and what they hear from their interlocutors into short statements and discrete sentences. Their responses often are
filled with hesitancy and inaccuracies as they search for appropriate linguistic forms and vocabulary while attempting to give form to the message.

Their speech is characterized by frequent pauses, ineffective reformulations, and self-corrections. Their pronunciation, vocabulary, and syntax are strongly influenced by their first language. In spite of frequent misunderstandings that may require repetition or rephrasing, intermediate low speakers generally can be understood by sympathetic interlocutors, particularly by those accustomed to dealing with non-natives.

Because the Chinese language is less commonly taught, the instructions and guidelines are different from general languages. I classified Chinese language learners in this study according to ACTFL Chinese Proficiency Guidelines – speaking. The ACTFL Chinese Proficiency Guidelines (Table 3) provide specific tasks and content that Chinese language learners can master at each proficiency level, as well as the limits they might encounter prior to moving to the next major level.

**Table 3. ACTFL Chinese Proficiency Guidelines**

<table>
<thead>
<tr>
<th>Nativelike</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Can make rather complicated factual comparisons (chéngli dé shēnghuó bì xiāngxià de yòu yìsi de duō le.). Has fairly consistent control of shí...de structure, question words used as indefinites (Wǒ zhèi yìcì lái jiù mánghái kāihuí, měiqù shènme dífang.), and some cohesive devices (búdàn...érqiě, suírán...kěshì). Can handle arrangements with Chinese administrators, i.e., regarding travel to China (Wǒ hòutīān yídīng děi dào Shànghǎi, huòshì fēijī piào huòshì huǒchē piào, qǐng nǐ xiǎng bānfā gěi wǒ méi yǐzhāng.). Can talk in a general way about topics of public interest (Nǐ juédé jǐnnián zhōngguó de jīngqí qīngkuàng zěnmeyàng?). Can explain a point of view in an uncomplicated fashion (Wǒ rènwéi chǎoji dàguó bù yīngdāng gānshè bié de guójì de shìqìng.).</td>
</tr>
<tr>
<td></td>
<td>Has flexibility in expressing time relationship (wǒ qù guò zhōngguó. Wǒháiyàoqù.), actual and a few potential resultative compounds (jǐntiān wǒ yǒu shí, wǒ làibùliáo le.), and simple comparisons (Zhōngguó de rénkǒu bí Méiguó de duō.). Can describe daily activities (Cóng xǐnqí yī dào xǐngqí sì wǒ méitiān dōu yǒu sāntáng kē.), likes, and dislikes in detail (Wǒ xīhuàn kàn zhōngguó xiàndài de xiǎoshuō, yǐnwēi wǒ kěyì duō zhīdào...).</td>
</tr>
</tbody>
</table>
Can ask and answer simple questions (yī gè rén de fángjiān, yìtiān duōshǎo qián?). Quantity of speech is increased and quality of speech is improved. Greater accuracy in word order, basic constructions, and simple time words (míngtiān, xiànzài) and other time markers to indicate various time relations. Has basic knowledge of differences among such sets of terms as huì, kěyǐ, néng; jiào, qǐng, wèn; zhīdào, rènshì but still makes errors.

Can ask and answer simple questions (nǐ zhù zài nǎr? nǐ zuò shén me shì/gōngzuò?) and initiate and respond to simple statements in the present time (wǒ jiā zài niǔyuē.). Can use limited constructions such as common verb-object phrases (hē píjiǔ). Can do simple modifications with de (wǒ de dàxuē) and le (wǒ lèi le.) indicating completion/status change. Most utterances contain fractured syntax and other grammatical errors (*wō chī fàn zài fándiàn.). Misunderstandings frequently arise from poor pronunciation, wrong tones, and limited vocabulary.

Participants’ ages ranged from 18 to 60, with a mean age of 32. Twenty-two were females, and 18 were males. Mean ages and genders in each language proficiency group were shown in Table 4. All English language learners were Asians, while 85% of the Chinese language learners were Caucasian, 5% were African Americans, and 5% were Asian Americans.

<table>
<thead>
<tr>
<th>Language Learners’ Chinese Demographic Information</th>
<th>Low intermediate</th>
<th>Intermediate</th>
<th>Advanced</th>
<th>Nativelike</th>
</tr>
</thead>
</table>

Materials
Each participant first was given a language background survey (Appendix 3). It included general demographic information of the participant and language background of the participants, such as languages they knew, years of exposure to each language, and self-evaluation of fluencies in various languages. Additionally, the survey provided specific information about participants’ experience, motivations, and challenges to learn English/Chinese, as well as their understanding of English and Chinese cultures. The survey contains information, such as educational background, heritage and language learning experience, and living abroad, which is critical for the screening and data analysis processes.

Two wordless picture books, *Frog, Where Are You?* by Mercer Mayer and *Tuesday* by David Wiesner, were used to elicit participants’ narratives during storytelling tasks.

*Frog, Where Are You?* by Mercer Mayer. Berman and Slobin’s (1994) *Frog* study pioneered the use of wordless picture books in cross-linguistic studies. Their cross-linguistic approach encompasses a broad range of languages (Berman, 2009). *Frog, Where are you?*, henceforth called, the *Frog* story then was widely applied in cross-linguistic empirical studies, especially for examining conceptualization of space and motion.

The following are the rationale for eliciting narratives using this picture book. First, this book represents a long and elaborate series of events, which allows readers to relate to a variety of topics (Berman & Slobin, 1994). Second, the book depicts richness in temporal expression and sequencing events. Third, it provides events related to back-front and up-down circumstances and the description of locative trajectories. All of these
intense uses of sequence events and locative trajectories meet the requirements of my study.

**Tuesday by David Wiesner.** A nearly wordless picture book, *Tuesday* also depicts an elaborate series of events and demonstrates similar features as in the *Frog* story, which employs a richness of temporal expressions and sequencing events. *Tuesday* employs extensive vertical spatial descriptions, such as frogs and pigs floating and falling. Although no current empirical study has used narratives from *Tuesday* for spatial expressions, this book could be critical for my study because it prompts readers to pay particular attention to vertical descriptions of the storyline. In particular, the sequencing events are represented clearly by the illustrations and the captions. Half of the sequencing events in the Chinese language rely on vertical expressions, which are not present in English. The analysis of participants’ narratives from *Tuesday* meets the main focus of my dissertation and helps with the analysis of cross-linguistic differences in spatial and temporal expressions between Chinese and English.

**Procedure**

Data were collected via an experimental approach and were collected by myself as an interviewer. The main language samples were collected through a storytelling task, and informal interviews were conducted during pre- and post-storytelling. Informal interviews were used as supplemental information for data analysis. Interview and storytelling tasks were conducted in a quiet room individually, were tape-recorded, and then transcribed in the original language.

**Language background survey.** After participants agreed to take part in my study, they were given a consent form and language background survey, both of which
were written in English and Chinese. The consent process was explained in their native language to ensure that the participants understood and felt comfortable about the study. Participants could answer the questionnaires in their preferred languages, and most of them felt more comfortable responding in their native language.

Informal interviews were conducted while participants were filling out the survey. The participants were free to ask questions. The interviewer initiated interaction with the interviewee in the participant’s L2, and most of the time, the interviewee replied in the L2. When the conversation addressed in-depth topics on L1 and L2 language issues, the language use usually switched to the interviewees’ native language. The interviews were bilingual and rich in code-switching.

The language survey fostered interviewees’ reflective thinking about their language learning experience and their own identity. It was a critical resource for me to understand participants’ linguistic, family, and cultural backgrounds. While I initiated conversation in their second language, participants had an opportunity to warm up prior to the narrative tasks. Moreover, through the language survey, I more accurately defined their proficiency levels in their second language.

**Narrative tasks.** The protocol for my study was the expansion of Berman and Slobin’s *Frog* study (1994). Each interviewee was given the same instructions in the participant’s native language. The interviewee was given a picture book and first was asked to look through the entire booklet. A deliberate effort was made to minimize the burden on memory, and the interviewees were aware that they would be asked to retell the story. Then, the interviewee told the story while looking at the pictures.
The narration was developed and finished by the interviewee, without any influence from the interviewer. During the storytelling, the interviewer minimized the verbal feedback to neutral comments and avoided prompts that might influence the interviewee’s choice of expression forms. The following prompt types were adopted from Berman and Slobin’s study (1994, p. 23), which were in order of neutrality: (1) silence or nod of head; (2) “uh-huh,” “okay,” “yes”; (3) “Anything else?”; (4) “and…?”; and (5) “Go on.”

Each participant performed four tasks of narratives: narration of Tuesday in L1, narration of Tuesday in L2, narration of Frog in L1, and narration of Frog in L2. The sequence of tasks might influence language learners’ expression of narratives, especially in L2. For instance, if a speaker first processed the story in L1, the speaker was likely to perceive the story in their native language, which resulted in a stronger L1 influence on the later L2 narration task. On the other hand, while one performed the narration task in L2 first, the L2 narration was likely to have less direct influence from L1 during the experiment. The sequence of elicited storybooks might result in different effects as well. For instance, Tuesday demonstrated a stronger feature in time sequence with less complicated scenes relative to the Frog story. The experiment was in a 2x2 design by task sequences differentiated by languages and stories.

Table 5. Experimental Designed Task Sequencing

<table>
<thead>
<tr>
<th>Design 1</th>
<th>Design 2</th>
<th>Design 3</th>
<th>Design 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday</td>
<td>Tuesday</td>
<td>Tuesday</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Frog</td>
<td>Frog</td>
<td>Frog</td>
<td>Frog</td>
</tr>
<tr>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>L1</td>
<td>Task 1</td>
<td>Task 4</td>
<td>Task 1</td>
</tr>
<tr>
<td>L2</td>
<td>Task 3</td>
<td>Task 2</td>
<td>Task 3</td>
</tr>
<tr>
<td>L1</td>
<td>Task 2</td>
<td>Task 3</td>
<td>L2</td>
</tr>
<tr>
<td>L2</td>
<td>Task 1</td>
<td>Task 4</td>
<td>L2</td>
</tr>
</tbody>
</table>
One person from each language group performs only one of the designed task sequences as displayed in Table 5. Each narrative was audio-taped and then transcribed for analysis.

**Coding**

Data consisted of 80 narrative samples in English and 80 narrative samples in Chinese, which became a 55,715-word collection of recordings, including 38,594 Chinese words and 17,121 English words. The data was optimal for providing a sufficient sample size to represent speakers from each language group and from each language proficiency level, while also retaining a manageable number of tokens that could reasonably be hand-coded.

For the purpose of this study, I compared the usages of various dimensional spatial referents to time between Chinese native speakers and CLLs and English native speakers and ELLs across proficiency levels. I also coded the usage of spatial referents to physical space to examine the correlations between spatial tokens and spatial-temporal tokens. Only spatial terms used in temporal metaphors were selected in this study. Directional referents in Chinese are more literal than in English. All of the directional referents are formed as compound words, such as ‘front’ 前 / ‘back’ 後 / ‘up’ 上 / ‘down’ 下 / ‘left’ 左 / ‘right’ 右.

The dependent variable of the experiment was the relative frequency of directional spatial terms referencing space and time in six categories: (a) horizontal-physical referents, (b) vertical-physical referents, (c) sideways-physical referents, (d) horizontal-temporal referents, (e) vertical-temporal referents, and (f) sideways-temporal referents. The values of spatial categories’ occurrences were divided by the total number of words by each participant in the story.
The coding process consisted of at least six rounds. The initial coding took place for my pilot study, which had 20 participants, and only the *Frog* story was coded. The purpose of the pilot study was to establish a coding system and to establish validity for my dissertation. Which words should be included, for instance, as spatial terms ‘eat up,’ ‘down town,’ or ‘above’? The discussions with colleagues were the first step to identify and narrow down potential coding. In my pilot study, data were solely hand-coded, and coding was in a broader range. As in Table 6, words including two dimensions, such as *over, above, under,* and *below* were coded.

<table>
<thead>
<tr>
<th>Table 6. Coding in Pilot Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
</tr>
<tr>
<td>before, proceed, front, back, after,</td>
</tr>
<tr>
<td>forward, toward, go, come, behind,</td>
</tr>
<tr>
<td>later, next, following, then, end, 前</td>
</tr>
<tr>
<td>qián (‘front’), 後 hòu (‘back’),</td>
</tr>
</tbody>
</table>

Meanwhile, coding in my pilot study was more concerned with token rather than with function. For instance, the term ‘end up’ was coded into a vertical temporal category, because the term was used as an expression of time. In addition, the word “besides” was coded on a symmetric line in my pilot study. Lastly, spatial terms were coded according to literal conventions, and no further investigation of the metaphorical meanings was performed.

To ensure the reliability and validity of this study, I revisited the transcribed *Frog* narratives from my pilot study. Data were coded at three levels, each of which involved two screening processes, automated searches, and manual tracking. The first level was to screen and color-code all potential spatial terms that might fall into each spatial category.
The first level of coding eliminated a broad range of spatial terms, including all ambiguities. According to Radden and Dirven’s topology of spatial time (2007), there are six correspondences between physical space and temporal space: (a) dimensions/orientations, (b) trajectory, (c) landmark, (d) search domain, (e) static relation, and (f) dynamic relation. I narrowed down my coding system by using what was defined in Radden and Dirven’s (2007) first type of space-time correspondence: There are three dimensions of physical space, which provide three coordinates of orientations. Only spatial terms that also are used as a one-dimensional time-axis with either a horizontal (i.e., front/back), vertical (i.e., up/down) or sideways (i.e., left/right) orientation were coded for analysis.

After all search terms again were identified and discussed with colleagues, search terms were determined. Then, I conducted a second level of coding to narrow down spatial references. This level involved more manual screening process. Because the main focus of this study was to contrast the usages of vertical temporal metaphors between Chinese and English languages, the study was limited to examining directional and one-dimensional prepositions in temporal and spatial expressions. Therefore, spatial referents that were not directional were excluded, such as end, then, and besides. Directional terms that involved more than one dimension also were excluded, such as above, below, under, and over. Any directional preposition describing the path of a thing also was excluded, such as along, about, and around.
Table 7. Coding in Current Study

<table>
<thead>
<tr>
<th>Horizontal</th>
<th>Vertical</th>
<th>Sideways</th>
</tr>
</thead>
<tbody>
<tr>
<td>before, after, front, back, behind,</td>
<td>up*, on*, down,</td>
<td>左 zuǒ (‘left’),</td>
</tr>
<tr>
<td>follow, ahead, proceed, next, later,</td>
<td>上 shàng (‘up’),</td>
<td>右 you (‘right’),</td>
</tr>
<tr>
<td>last, -ward,</td>
<td>下 xià (‘down’),</td>
<td>(一)邊 yī-biān (‘side’)</td>
</tr>
<tr>
<td>前 qián (‘front’), 後 hòu (‘back’),</td>
<td></td>
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</tbody>
</table>

After spatial referents were defined in Table 7, the last level was to finalize the coding. The coding system was based on spatial metaphor of time. I also coded the usages of these terms used in physical spatial expression. As pointed out earlier, the expressions of physical space are fundamental to time expression in language acquisition (Clark, 1973; Richards & Hawpe, 1981). To study L2 learners’ acquisition of spatial-temporal metaphors, it is important to examine their expressions of physical space. Using automated searching allowed me to retrieve the defined spatial referents, and then I manually coded physical-space terms and temporal-space terms. Each category is explained in more detail below.

**Horizontal orientations.** Horizontal referents are based on one dimension with front-back orientation. In Chinese, ‘front’前 qián/‘back’後 hòu were the main search terms for horizontal referents. 後 hòu ‘back’ is the most frequent spatial referent for time in Chinese narratives. Compound horizontal referents of hòu include ráng-hòu ‘so-back’ (‘then’) as in Examples (18a-c), zuǐ-hòu ‘most-back’ (‘lastly’), zhī-hòu ‘that-back’ (‘afterwards’) as in Example (18d), hòu-lái ‘back-come’ (‘later’), and yī-hòu ‘according-back’ (‘afterwards’) as in Example (18e). Chinese uses hòu ‘back’ as spatial referents for time to indicate later events.

(18) a. 然後這個青蛙一直往前進的時候...
    ráng-hòu zhè-ge qīngwā yì-zhǐ wǎng-qián jin de shí-hòu...
    so-back this-CL frog straightforward toward-front MOD moment
‘Then, when the frog continues moving forward…’ (201_Tues_Ch, line 37)

b. 然後他們去房子後面
   rán-hòu tā-men qù fāng-zi hòu-miàn
   so-back 3 pl to house back
   ‘Then, they go to the back of the house.’ (172_Tue_Ch, line 37)

c. 然後下週二的早上七點
   rán-hòu xià-ge xīng-qì-èr de zǎo-shàng qī-diǎn
   so-back down-CL week-two NOM early-up 7-o’clock
   ‘Then, next Tuesday 7 am’ (201_Tues_Ch, line 40)

d. 我現在才發現那個狗跳下來之後…
   wǒ xiàn-zài cái fā-xiàn nà-ge gǒu tiào xià-lái zhī-hòu
   1 pl. now just discover that-CL jump down-come that-back
   ‘Now I just realize after the dog jump downward…’ (102_Frog_Ch, line 23)

e. 掉下來以後…
   diào xià-lái yǐ-hòu
   drop down-come according-back
   ‘After he fell off’ (010_Frog_Ch, line 193)

f. 他們就跑去後院
   tā-men jiù pǎo qù hòu-yuàn
   3 pl. then run to back-yard
   ‘they then run to the back yard’ (157_Frog_Ch, line 19)

Hòu as a physical-spatial referent was used mostly to indicate location, such as the
element in (18b) hòu-miàn ‘back-side’ or in (18f) hòu-yuàn ‘back yard.’ The word hòu is
a high frequency spatio-temporal referent in Chinese. Almost all of the sequential
adverbs in Chinese are spatial metaphorical. Among the sequential adverbs, the
compound words with hòu ‘back’ is used most commonly to indicate later events.
Therefore, the frequency of using the spatial term hòu to reference time is much greater
than physical reference.

Usages of the spatial referent 前 qián ‘front’ are the counterpart of 後 hòu ‘back.’
Opposed to hòu ‘back,’ temporal referents with the directional word qián ‘front’ are used
to indicate earlier events, such as *cóng-qián* in Example (19a) and *yǐ-qián* in Example (19b).

(19) a. 從前在一個很溫馨的小屋子裏面
   *cóng-qián* zài yī ge hěn wēn-xīn de xiǎo fāng-zi lǐ-miàn
   *from-front* in one CL very cozy NOM little house *in-side*
   ‘A long time ago, inside a very cozy little house’

   (010_Frog_Ch, line 002)

b. 我們的朋友比以前還要更多
   wǒ-men de péng-yǒu bǐ yǐ-qián hái-yào duō
   *1pl. MOD friend compare according-front still-want more*
   ‘We are making more friends’

   (010_Frog_Ch, line 438)

The frequency of using *front* as a temporal metaphor is less than the frequency of using temporal metaphors of *back*. As in English, Chinese speakers use many conjunctions in the narrative to connect sequences of events. The description of event ordering usually follows the sequence of a story line. Therefore, it is more common to use the conjunction *then* rather than *before*. As in Examples (20a-b) usages of *qián* ‘front’ without referencing time were coded into a physical-spatial category.

(20) a. 好像不看前面
   hǎo-xiàng bú-kàn qián-miàn
   *very-alike no-look front-side*
   ‘seems not to look at the front’

   (137_Tue_Ch_line 119)

b. 也像披風前面的圍衣服
   yě-xiàng pī-fēng qián-fāng-yī-qiú yī-fú
   *also-alike cape front-side cloth*
   ‘also looks like the cloth of front cape’

   (128_Tue_Ch, line 32)

Most temporal expressions strongly imply *front-back* relationships in space (Richards & Hawpe, 1981). In Chinese, there are only two directional words with horizontal front-back orientation, *qián* ‘front’ and *hòu* ‘back,’ but there are more terms for horizontal front-back orientation in English language, as discussed in Chapter 2.

Determining English spatial referents is more challenging due to a wide range of spatial terms. I selected a pool of spatial search terms based on the coding in my pilot study.

After coding at three levels, English horizontal references were determined and narrowed
down to the following directional referents: *before, after, front, back, behind, follow, ahead, proceed, next, later, last,* and the suffix “*ward.*” I first used these spatial referents as search terms to retrieve spatial orientations in narratives.

Some of the determined spatial terms did not occur in the data, such as *ahead,* *proceed,* and *backward,* whereas some directional words appeared only in either a physical (literal) or a temporal (figurative) category. For instance, the only tokens of *front* referred to physical space as in the narratives in Example (21), whereas the word *later* referred only to time sequencing as in Example (22). Most space-horizontal spatial referents were used to reference time.

(21) Here is a little frog on the *front* page. (133_Frog_En, line 002)

(22) And then *later,* they, they sleep. (200_Frog_En, line 007)

Among those, *before* and *after* are high-frequency spatial referents. As Richards and Hawpe (1981) suggest, *before-after* occur in language in the temporal sense. Tokens of *before* and *after* were used as spatial references in time, as in Examples (23a) and (23b), rather than in physical spatial references, as in Examples (23c) and (23d).

(23) a. And *before* they know... (282_Tue_En, line 012)
   c. But the deer stopped right *before* the cliff (156_Frog_En, line 046)
   b. but *after* that they go outside (011_Frog_En, line 045)
   d. the bee is running *after* the dog (011_Frog_En, line 113)

Usage of *before* as a physical spatial expression in the narratives is rare--there is only one example in my data (Example 23a). On the other hand, *ahead-behind* are used primarily as literally spatial expressions instead of as temporal metaphors (Richards & Hawpe, 1981). In my data, while there was no token of *ahead,* the only tokens of *behind* were explicitly marked for spatial usage, e.g., *there is a creek behind my sister’s house.* Other
spatial referents signified as *front-back* orientations, such as *following*, were used mostly to refer to later in time ordering as in Example (24a). In the sentence in Example (24b),

(24) a. The *following* Tuesday… b. When he was *following* Timothy around.  
(282_Tue_En, line 036) (124_Frog_En, line 023)

*follow* was the literal expression of the motion of the trajectory. Another term to reference a later point in timeline as *front-back* orientation was *next* as in Example (25b). However, the use of *next to* in Example (25a) was considered as a horizontal orientation. The use of *next to* is similar to

(25) a. They are *next* to a lily pad. b. The *next* morning looks *down* into jar.  
(165_Frog_En, line 063) (165_Frog_En, line 012)

*next* is similar to

(26) a. So I keep going *forward* … b. And they move *forward*.  
(213_Frog_En, line 076) (146_Frog_En, line 032)

Without looking at the context, both examples could be considered as both temporal and physical spatial references. As in, ‘So the deer drive him away, run towards, to go somewhere. So I keep going *forward* and the deer suddenly stop (213_Frog_En, lines 73-77).’ I considered *keep going forward* here to be more figurative than literal, which
indicated ‘going continuously.’ The word *forward* in Example (26a) was used to represent the extension of a timeline and movement and was tallied under the category of the horizontal temporal metaphor. In most narratives, the term ‘move forward’ is usually figurative, indicating ‘moving to the next stage.’ In the case of the sentence in Example (26b), the speaker literally described a series of activities after the analysis of the content below:

So the deer to poke him up, and, so he is riding on the deer’s head. The dog is sniffing the bumble bees. And they move *forward*. And the boy calls into the hole (146_Frog_En, lines 29-33).

I considered the phrase, *move forward*, to literally indicate the direction of the movement rather than the description of temporal sequencing.

(27) a. He’s *back* to his lily pad. b. Then, he goes to the *back*yard.
(138_Tue_En, line 210) (174_Frog_En, line 13)

Similarly, *back* in Example (27a) was not easily defined as a literal or figurative spatial referent. *Back* in Example (27b) was relatively easy to define, as it literally described physical location in the yard. However, *back* in Example (27b) is not as clear as in Example (27a). Expressions, such as *come back*, *return back*, and etc., depend on the speaker’s mental space and mental timeline. I coded Example (27b) as a temporal space, as it refers to the earlier status or location.

The word *last* is another spatial referent that is ambiguous to distinguish between physical spatial uses and spatio-temporal metaphors. As defined in the dictionary, *last* means ‘recent event,’ and it also means ‘only one left.’ Therefore, I coded the tokens of *last* in the context of the narratives as the first meaning ‘recent event’ to be horizontal-temporal referents, such as in Example (28a).
(28) a. What happen *last* night.  
   (180_Tue_En, line 048)  
  b. The boy (Hm) in the *last* picture here.  
   (237_Frog_En, line 067)  
  c. And then the *last* page  
   (164_Frog_En, line 093)

Because in Examples (28), *last* was used to indicate the only picture/page left in the story, they were coded in the horizontal-physical referent category.

**Vertical orientations.** As Gunter and Dirven (2007) contend, vertical is the most important coordinate among our three spatial orientations and is more significant in our daily life experience than the horizontal coordinate, which matches the coding results from my data. Similar to horizontal orientations, Chinese vertical orientations are limited to the use of lexicons ‘up’ 上 *shàng* / ‘down’ 下 *xià*. In Example (29), both *shàng* and *xià* are in the physical

(29) 從神秘的地毯上掉下了  
    from mystery MOD floor-rug up drop down PART  
    ‘Dropped out of the mystical rug’  
    (044_Tue_Ch, line 025)

sense, denoting the movement from vertically above to below a landmark, which is the rug. In Chinese narratives, there are extensive *up-down* references in temporal expressions, such as those in sentence (18c) 下個星期二 *xià-ge xīng-qì-èr* (‘down week-2’) ‘next Tuesday’ and 早上 *zǎo-shàng* (‘up-noon’) ‘morning.’ Furthermore, high-frequency use of *shàng-xià*, indicating time of the day, e.g., 晚上 *wǎn-shàng* ‘late-up’ (evening), 上午 *shàng-wǔ* ‘up-noon’ (morning), and 下午 *xià-wǔ* ‘down-noon’ (afternoon). Both *hòu* for horizontal orientations and *xià* for vertical orientations have the function that indicates later and earlier in time sequencing, such as 上次 *shàng-cì* ‘up-occurrence’ (last time) and *jiē-xià-lái* ‘connect-down-come’ (following).
While describing the sequences of the storyline, later events usually are implied explicitly. Hence, usages of xià and hòu occurred more frequently than shàng and qián.

In addition to expressions of time and event sequencing, shàng-xià ‘up-down’ often is used to indicate static duration corresponding to static extent. In Chinese daily life, yí-xià, literally meaning ‘a short while,’ is a commonly used tentative marker to imply a quick action or an action in a casual manner. As in Example (30) kàn yí-xià ‘take a peek’ indicated

(30) 再看一下青蛙
zài kàn yí-xià qīng-wā
again look one-down green-frog
‘Take a peek at the frogs’
(127_Frog_En, line 008)

the person did not pay much attention while seeing the frog. Another term, mǎ-shàng ‘horse-up,’ literally means on the horse and is commonly used as its metaphorical extension, to describe things happening immediately. The metaphorical association of mǎ-shàng was derived from the historical fact that once a messenger received a message from the emperor, the messenger had to ride immediately on horseback to fulfill the mission.

The counterparts in English, up-down orientations, consist of various vertical spatial terms. English vertical references that I coded were like those in Example (30 a-e).

All tokens associated with vertical orientations are literally in the physical sense, such as fall down,

(30) a. the dog fall down the window  (017_Frog_En, line 030)
b. Then, boy is picked up.  (087_Frog_En, line 015)
c. lifts him up onto his head.  (146_Frog_En, line 062)
d. but he was on top.  (114_Frog_En, line 037)
e. something upon the deer’s head.  (005_Tue_En, line 033)
pick up, up onto, on, and upon in the sentences. Among these prepositions, on consists of multiple properties. As in Gunter and Dirven (2007):

…some situations of a trajectory’s contact can be seen in contact with the surface of an object…Gravity makes a trajectory vertically rest upon a landmark, which counteracts to this force by supporting the trajectory, as in the book on the table. Situations in which a trajectory touches a landmark sideways… (p. 312)

Gunter and Dirven (2007) used the example, the ladder is on the wall, to contrast the example, the lamp is on the ceiling, in which the first example is the situation that a trajectory touches a landmark sideways while that second example signifies that the trajectory is attached to the ceiling (p. 312).

Further, as discussed earlier, English does not use temporal terms derived from top-bottom; some specialized terms that derive from the use in spatial expressions are actually the linear expressions on a horizontal plane without vertical properties (Clark, 1973).

(31) a. the little boy continued on his journey (028_Frog_En, line 039)
b. and he keep on barking. (146_Frog_En, line 3)

In Example (31), the progressive action was described by the preposition on, which is the linear extension of the action timeline. Therefore, on in Example (31) was coded into the horizontal temporal category instead of into vertical temporal category. A few examples of the preposition on for temporal expression were found, but none of them signals usage of time at a vertical plane.

There were more tokens of up in the narratives across native and non-native English speakers, such as give up, show up, dress up, tie up, finish up, etc. Most of these
phrases referred to a static condition rather than to temporality. Hence, *up* as a static was
not coded for analysis purposes.

**Sideways orientations.** Coding of sideways orientation was the most challenging

task to perform. Words of sideways orientation can be categorized as either *front-back*
and *left-right* orientations on the horizontal plane. At the first level of coding, I included
*besides, ‘side’ 邊 biān, ‘left-right’ 左右 zuǒ-yòu* in the categories of sideways spatial and
temporal referents, because both terms indicate *front-back* and *left-right*, which are
unidirectional in their definition (Radden & Rirven, 2007). Therefore, in addition to ‘left-
right’ 左右 zuǒ-yòu (32) in Chinese, which has been establish in literature (e.g., Traugott,
1975; Xing, 2000), I included the spatial word ‘side’ 邊 biān, because extensive temporal
expression use 一邊…一邊 yì-biān…yì-biān to indicate co-occurrence actions as in
Example (33), as well as

(32) 八點左右
bā-diǎn zuǒ-yòu
8 o’clock left-right
‘around 8 o’clock’

(223_Tue_Ch, line 002)

(33) 這個狗狗一邊聞著荷葉一邊說
zhè-ge gǒu-gou yì-biān wén zhe hé-yè yì-biān shuō
this CL dog one-side smell lily-pad one-side speak
‘This dog is talking while smelling at the lily pad’

(014_Frog_Ch, line 285-286)

the spatial term ‘separate’ 隔 gé in the temporal expression of the ‘next day’ 隔天 gé-tiān.

During the second level of coding, I included –*side*, ‘side’邊 biān and ‘next day’ 隔天 gé-
tiān problematic. Although a spatial term, 一邊…一邊 yì-biān…yì-biān, has extensive
uses in sideways temporal expressions, it is not easy to define systematically the
counterpart ‘side’邊 biān as a sideways spatial referent. For instance, only the 旁邊 be-
side in Example (34 a) explicitly signifies sideways; others, such as 外邊 wài-biān (in 34 b), 上邊 shàng-biān

(34) a. 他們就聚在電視旁邊
tā-men jiù jù-jí zài diàn-shi páng-biān
3 pl. then gather-together at TV be-side
‘They then get together next to the TV’
(206_Tue_Ch, line 035)

b. 窗戶的外邊
chuānghù de wài-biān
window MOD out-side
‘outside the window’
(095_Tue_Ch, line 022)

c. 青蛙在葉子的上邊
qīngwā zài yèzi de shàng-biān
frog at leaf MOD top
‘frogs are on the leaves’
(063_Tue_Ch, line 007)

d. 烏龜在這邊
wūguī zài zhè-biān
turtle PREP here
‘the turtle is here’
(003_Tue_Ch, line 006)

(in 34 c), and 這邊 zhè-biān (in 34 d), are the satellite locatives that need a directional word as a prefix to indicate the location.

The counterpart in English, -side, such as beside and aside, had similar problems. Although both seem to carry spatial sense, in most cases, they are logical terms rather than temporal terms (Traugott, 1975). In other words, aside or beside never indicate co-occurrence. I excluded most of the compound words with ‘side’ 邊 biān from the coding, because the word itself does not signify direction; it does not meet the coding criteria.

Similarly, because 隔 gé in 隔天 gé-tiān means ‘interval,’ and although it carries a spatial sense, it was excluded due to the lack of a sense of direction. However, 一邊 yì-biān ‘one side’ was coded, because it also functions as temporal referent, “in the meantime.”

Instead of describing sideways as a left-right orientation, I finally defined sideways orientation as a symmetric sideways development. In Chinese, only ‘left-right’ 左右 zuǒ-yòu meets the criteria of one-dimensional and directional orientation. The
directional term *left-right* in Chinese is systematically used in a sideways temporal sense. There is no sideways temporal usage in my coding system.

**Synthesis**

Empirical studies exploring spatial and temporal conceptualization in bilingual speakers have been conducted mostly through the stimulus-response approach (i.e., Boroditsky, 2001). This study was designed to examine each sociocultural and cognitive language. Narrative tasks elicited by wordless storybooks allow researchers to study various linguistic elements in cross-language communities. Furthermore, narratives provide resourceful and authentic data for exploration of thought and language in speakers from both quantitative and qualitative paradigms.

<table>
<thead>
<tr>
<th>Table 8. Total Tokens of Spatial/Temporal Coding</th>
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<td>Space</td>
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<td>Horizonta</td>
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Vertical

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<td>下</td>
<td>117</td>
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</tr>
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<td>12</td>
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<tr>
<td><em>on</em></td>
<td>130</td>
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sideways

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<th>Time</th>
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<tr>
<td>左右</td>
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<td>2</td>
<td>2</td>
</tr>
<tr>
<td>一邊</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
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Data were collected between Chinese and English language learners across various proficiency levels. Each participant contributed to the analysis of their native language and of their target language, either Chinese or English. The narratives elicited from two different stories resulted in a different frequency of language usages in spatial and temporal references, because both books consist of different story maps and themes.

The summary of the coding system in this study is shown in Table 8. The results demonstrated that there is no temporal expression at the vertical and sideways dimensions in English narratives. Meanwhile, English high-frequency spatial-temporal terms were more likely to be in the temporal sense, such as back, next, and on. Among English spatial references, the preposition on is the only vertical reference that frequently signals physical spatial property and also indicates the extension of time. However, the extension of time is considered as a horizontal visual line. Hence, the tokens of on in this study were coded either in the vertical spatial category or in the horizontal temporal category.

In Chapters 4 and 5, quantitative and qualitative analyses of the study are discussed. The language usages between the two languages and among language learners of multiple proficiency levels will be examined. Then, variations between stories are addressed.
Chapter 4

Quantitative Findings

Data analysis was conducted to examine the frequencies of spatial and spatial-temporal referents on the vertical, horizontal, and sideways planes in Chinese and English across language proficiency levels through narratives elicited from two books, *Frog, Where are You?* (referred to as *Frog* hereafter) and *Tuesday*. The investigations of form-function relationships contributed to the understanding of these variations of speech and thought in different native languages and L2 learning process. Three main quantitative data analyses were performed to evaluate differences within and between each group of speakers. Then, the analyses of differences and similarities of spatial and spatial-temporal tokens led to the qualitative analysis of language functions, and more specifically, to the habitual language use of spatial and spatial-temporal expressions among different language groups.

Two sets of analyses of variance (ANOVAs) aimed to answer the first two research questions of this study, investigating cross-linguistic variations between Chinese and English speech communities and L1 influence among groups of L2 learners. An additional set of ANOVA tests was to test stimuli (storybooks) as the independent variable and how stimuli influenced a speaker’s language use.

The analyses for dependent variables, horizontal, vertical, and sideways physical referents, and horizontal, vertical, and sideways temporal referents were used to measure the differences of habitual language use between language groups and within language groups. Furthermore, this study compared the stories generated in English and Chinese by
the same person to determine how their production of spatial and temporal referents was influenced by the language of elicitation.

**Spatial and Spatial-temporal Concepts in Chinese and English Speakers**

Cross-linguistic analysis addressed the first research question of this study: How do Chinese and English speakers conceptualize and express spatial and spatial-temporal concepts differently in their L1; to what extent does habitual language use reflect on different dimensions of spatial referents and spatiotemporal metaphors, including the vertical, horizontal, and sideways planes? This section aims to investigate habitual language use of spatial and temporal expressions and to test the linguistic relativity hypothesis in Chinese and English speech communities. In this part of the analysis, only native language samples were analyzed. Twenty-one native English speakers and 20 native Chinese speakers told *Frog* and *Tuesday* stories in their native language. A total of 82 narratives in either English or Chinese were used for cross-linguistic analysis.

The predicted differences between the two language groups were revealed in the interaction of stimulus (storybooks) and referent category. Three ANOVAs were conducted to compare the expressions of spatial and spatial-temporal differences between Chinese and English speech communities. The interaction of stimuli and the category of spatial referents indicated the difference in language uses between the Chinese and English speech communities.

**Comparing Chinese and English Speakers.** The first ANOVA test was to determine the general cross-linguistic variations of spatial and temporal referents between Chinese and English speakers. Language samples of each speech community were elicited with two wordless storybooks, *Frog, Where Are You?* and *Tuesday*. The main
difference of spatial usages between two languages was confirmed by a three-way interaction in a 2 language X 2 story X 6 spatial category ANOVA. There was a main effect of language, $F(1, 468) = 23.38, p < .01$. Overall, Chinese speakers ($n = 20$) made slightly more spatial expressions in narratives ($M = 3.75\%$) than English ($n = 21$) speakers ($M = 2.75\%$) (Figure 8). The main effect of the spatial referent category in all language samples also was statistically significant, $F(5, 468) = 88.9, p < .01$. The interaction of language by spatial referent was statistically significant, $F(5, 468) = 23.34, p < .01$. Statistically significant differences between Chinese and English languages were found in frequency of three spatial categories: horizontal-spatial referents, $F(1, 39) = 8.99, p < .01$; horizontal-temporal referents, $F(1, 39) = 16.02, p < .01$; and vertical-temporal referents, $F(1, 39) = 142.03, p < .01$. English speakers had more horizontal-spatial usages ($M = 25\%$) than Chinese speakers ($M = 8\%$) in their native languages. English speakers used $25\%$ of horizontal-spatial expressions in their total English storytelling, while Chinese speakers only had $8\%$ of horizontal-spatial expressions in their total Chinese storytelling. On the other hand, Chinese speakers had a much higher frequency use of horizontal referents in temporal expressions ($M = 3.42\%$) than English speakers ($M = .96\%$) during their first language storytelling. The frequency use of vertical referents in temporal expressions among Chinese speakers ($M = 1.3\%$) also was significantly higher than among English speakers ($M < .01\%$) in their native language data.
To further examine whether the same patterns were observed in the two stories, two separate 2 language X 6 spatial categories ANOVAs were conducted based on data from *Frog* and from *Tuesday* to explore differences in each category of spatial referent between Chinese and English speakers. The results demonstrated statistical differences in both horizontal and vertical usages but not in sideways expressions. Therefore, sideways referents will not be discussed in the following sections of native language data analysis.

**Comparing spatial referents in *Frog* narratives.** Based on native language data elicited from *Frog*, native English speakers used more horizontal physical expressions ($M = .3\%$) than native Chinese speakers ($M = .1\%$), $F (1, 40) = 4.408, p < .05$. Native Chinese speakers had more horizontal temporal expressions ($M = 1.9\%$) than native English speakers ($3\%$), $F (1, 40) = 19.05, p < .01$. Although the difference in vertical physical expressions between native Chinese speakers and English speakers was not statistically significant, the difference in using vertical referents in temporal system was significant, $F (1, 40) = 41.20, p < .01$. Native Chinese speakers used more vertical-temporal referents than native English speakers in *Frog* stories. As predicted, there was no vertical-temporal usage in native English language data, but native Chinese speakers’ tendency to use vertical temporal expressions was .25% in *Frog*. When comparing native
Chinese and English speakers’ speech in *Frog* stories, the patterns of frequency of spatial referents in various dimensions were similar to the sum of both stories (see Figures 8 and 9).

**Figure 9. Mean Frequency (%) of Spatial Referents in *Frog* Story**

![Figure 9](image)

**Figure 10. Mean Frequency (%) of Spatial Referents in *Tuesday* Story**

![Figure 10](image)

Comparing spatial referents in *Tuesday* narratives. As shown in Figures 9 and 10, native language data fostered from *Tuesday* showed different results from those of *Frog* at physical spatial expressions. Unlike in *Frog*, *Tuesday* narratives showed no significant difference in horizontal referents usage. Like in *Frog*, native speakers of Chinese used significantly more horizontal-temporal referents ($M = 1.52\%$) than English speakers ($M = .7\%$), $F (1, 40) = 8.01, p < .01$. Along the vertical dimension, the results in *Tuesday* were similar to those in *Frog*. A statistically significant difference was found in vertical referents in expressing physical space between native Chinese and English speakers, $F (1, 40) = 11.73, p < .01$. *Tuesday* prompted native English speakers to use
more vertical physical expressions ($M = 1.76\%$) than native Chinese speakers ($M = .92\%$). Native Chinese speakers used significantly more vertical-temporal expressions in Tuesday ($M = 1.04\%$), while no vertical-temporal referent was found in native English speakers’ speech, $F(1, 40) = 124.71, p < .01.$

**Story Comparison.** The previous sections of native language data analysis resulted in variations between the two stories used to elicit the language sample. To test if different picture stories prompted participants to speak differently, the analysis in this session used stimulus stories as a variable to determine if there were differences in using various spatial and spatial-temporal referents between *Frog, Tuesday*, and the sum of both stories within each group of native language speakers. Six one-way ANOVAs comparing the frequencies of spatial referents for each category of spatial referent for the 2 language X 3 story types were conducted to confirm the statistical effects between stories. The main effects were found in horizontal-spatial, $F(3, 78) = 7.68$; horizontal-temporal, $F(3, 78) = 9.9$; vertical-spatial, $F(3, 78) = 4.52$; and vertical-temporal categories, $F(3, 78) = 94.14, ps < .01.$
Pair-wise comparisons within the same language groups and between stories were included in the discussion. Horizontal-physical and vertical-physical frequency usages between English *Tuesday* and *Frog* were statistically different. Native English speakers used more horizontal terms indicating physical space in *Frog* ($M = .30\%$) than in *Tuesday* ($M = .22\%$), whereas native English speakers used more vertical terms in *Tuesday* ($M = 2.16\%$) than in *Frog* ($M = 1.51\%$). A statistical difference between *Tuesday* and *Frog* in native Chinese speakers was found only in the vertical-temporal category. Native Chinese speakers used more vertical terms expressing time in *Tuesday* ($M = 1.08\%$) than in *Frog* ($M = .22\%$).

**Spatial and Spatial-temporal Concepts in L2 Speech**
This section addressed the second research question: To what extent does first language (L1) influence the development of spatial expressions and spatiotemporal conceptualizations in one’s second language (L2) across proficiency levels; how do Chinese/English language learners conceptualize spatiotemporal metaphors, including the vertical, horizontal, and sideways planes, while speaking in their second language? The analyses in the following sections aims to study spatial and spatiotemporal concepts developing in L2 learners across language proficiency levels and how spatial and spatiotemporal concepts in one’s L2 differ from those in their native speech.

Six one-way ANOVA tests were computed to compare the usages of each spatial referent category across five language proficiency levels in both Chinese and English language samples. Spatial referents in six categories at three dimensions were the dependent variables, and five levels of language proficiency were the independent variables. The five proficiency levels were beginning, intermediate, advanced, native-like language learners, and native speakers of the target language.

**Chinese language samples across Chinese language proficiency levels.** The main differences of Chinese spatial usages among five language proficiency levels were confirmed by six one-way ANOVAs by comparing means of spatial tokens and frequencies of spatial referents (physical and temporal) at three dimensions (horizontal, vertical, sideways). Chinese language samples were narratives elicited from both *Frog* and *Tuesday* stories among native Chinese speakers \( (n = 20) \) and beginning \( (n = 5) \), intermediate \( (n = 5) \), advanced \( (n = 6) \), and native-like \( (n = 5) \) Chinese language learners (CLLs). ANOVAs, based on three data conditions--total Chinese language samples, Chinese *Frog* narratives, and Chinese *Tuesday* narratives--were computed to compare
mean frequencies of each spatial category. The following sections discuss the main effects of each spatial category and interactions among language groups.

*Horizontal referents for physical space.* There was no statistical main effect and interaction in the cross-proficiency-level comparisons in the category of horizontal-spatial referents. However, according to the data shown in Figure 13, except for beginning learners,

![Figure 13. Mean Frequency (%) of Horizontal-spatial Referents in Chinese Stories](image)

CLLs used slightly more spatial referents to describe physical space in Chinese storytelling than did native Chinese speakers. This finding was consistent with the cross-linguistic analysis between native Chinese and English speakers’ speech in the earlier session that horizontal spatial usages in native English speakers were significantly higher than native Chinese speakers (c.f., Figures 8-12).

*Horizontal referents for time.* There was a main effect on the horizontal-temporal category in all Chinese narratives across five levels of language proficiency by comparing their mean frequencies, $F(4, 36) = 3.57$, $ps < .01$.  

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Tukey’s follow-up pairwise comparisons for mean tokens and frequencies in Chinese narratives revealed statistical differences while comparing native Chinese speakers ($M = 3.42\%$) with beginning CLLs ($M = .8\%$) and advanced CLLs ($M = .1\%$), both $ps < .05$ (Figure 14).

No significant difference was found in Chinese Frog narratives and Tuesday narratives when comparing means of horizontal-temporal frequency among speakers of various proficiency levels. Results from Chinese language data suggested that native Chinese speakers used more horizontal-temporal terms than CLLs across various proficiency levels. This finding is consistent with the cross-linguistic analysis between native Chinese and English speakers’ speech in the previous section that revealed that the Chinese-speaking community used significantly more horizontal referents for time terms than the English-speaking community.

**Vertical referents for physical space.** As discussed in the previous cross-linguistic section, although the comparisons of native language samples demonstrated that English speakers used more vertical terms in physical spatial expressions than Chinese speakers, only Tuesday narratives had a statistically significant effect (Figures 8-12.). However, none of the results from any ANOVA tests comparing mean frequencies
of vertical-spatial referents in Chinese narratives showed significant main effects and interactions among proficiency groups, as shown in Figure 15.

Looking at the Chinese cross-proficiency-leveled results computed from the ANOVA test based on *Tuesday* narratives (Figure 15), except for the beginning level, other CLL groups had slightly higher frequency use of vertical physical expressions in *Tuesday* narratives. This finding was consistent with the cross-linguistic findings in the *Tuesday* story that native English speakers used more vertical-spatial expressions in their speech.

**Figure 15. Mean Frequency (%) of Vertical-spatial Referents in Chinese Stories**

![Figure 15](image)

*Vertical referents for time.* No main effect was found in frequency use of vertical-temporal referents in Chinese narratives and Chinese *Tuesday* narratives across language proficiency levels, but a significantly main effect on vertical-temporal frequency use was found in Chinese *Frog* narratives, $F(4, 36) = 3.27, p < .01$. However, no significant difference was found among various language proficiency groups, according to Tukey’s pairwise comparisons (Figure 16).
Despite no significant differences among language proficiency levels found in frequency use of vertical referents for time in the Chinese narratives, there were significant main effects on mean tokens of vertical-temporal referents among language groups in Chinese total narratives $F(4, 36) = 5.92$, Frog stories $F(4, 36) = 3.05$, and Tuesday stories $F(4, 36) = 3.27$, $ps < .05$. Tukey’s follow-up pairwise comparisons indicated significant differences between advanced CLLs ($M = 13.83$) with beginning ($M = 4.6$) and intermediate CLLs ($M = 4.6$).

**Sideways referents.** There were some tokens of vertical referents in Chinese narratives, but no main effect was found on means of vertical reference for either physical space or time.

**English language samples across English language proficiency levels.** The results of differences in English spatial usages (six spatial categories) among five language proficiency levels were confirmed by six one-way ANOVAs. Mean differences of physical and temporal spatial tokens and frequencies were compared at three dimensions (horizontal, vertical, sideways). Like Chinese language data, English narratives were elicited from the *Frog* and *Tuesday* stories among native English speakers ($n = 20$) and beginning ($n = 5$), intermediate ($n = 5$), advanced ($n = 6$), and
native-like \((n = 5)\) ELLs. ANOVAs based on three data conditions (total English language samples, English *Frog* narratives, and English *Tuesday* narratives) were computed to compare mean tokens and mean frequencies of each spatial category.

The main differences of English spatial usages among five language proficiency levels were found only in the category of vertical referents for physical space.

**Vertical referents for physical space.** Significant main effects on mean frequency of vertical-physical referents were found in English narratives \(F(4, 77) = 4.14, p < .01\) and in English *Tuesday* narratives \(F(4, 36) = 4.59, p < .01\) across language proficiency levels. No significant difference in mean frequency of spatial referents was found in the English *Frog* narrative.

According to Tukey’s follow-up pairwise comparisons of total English narratives (Figure 17), the mean frequency of vertical-spatial referents in native English speakers \((M = 1.5\%)\) was higher than native-like English language speakers \((M = .8\%), p < .05\).

![Figure 17. Mean Frequencies (%) of Vertical-spatial Referents in English Stories](image)

Tukey’s pairwise comparisons of English *Tuesday* narratives showed that the mean frequency of vertical-physical referents in native English speakers \((M = 1.8\%)\) are higher than advanced ELLs \((M = .6\%), p < .05\).

There also was a main effect on mean tokens in vertical-physical referents in English total narratives \(F(4, 77) = 3.25, p < .05\). On the other hand, a main effect was
found in _Frog_ narratives, $F(4, 36) = 3.62, p < .05$ but not in _Tuesday_ narratives. Both total English narratives and English _Frog_ narratives showed that beginning ELLs ($M = 22.4$) had more vertical tokens referencing physical space than advanced ($M = 9.6$), native-like ($M = 9.2$), and native English speakers ($M = 13.43$). The significant differences were confirmed by Tukey’s follow-up pairwise comparisons (Figure 17).

**Within Subject Comparisons: Spatial and Spatial-temporal Concepts in L1 & L2**

This section sought to answer the second research question: To what extent L1 influences the development of spatial expressions and spatiotemporal conceptualizations in L2 across different proficiency levels. The comparisons of the usage of spatial and spatiotemporal referents in Chinese/English language learners’ L1 and L2 were utilized to understand L1 influence in L2. Separate paired $t$-tests were used to compare mean frequencies of each spatial category between L1 and L2 within each language proficiency group. The following sections demonstrate the interaction of each spatial category between L1 and L2 within each language group.

**Spatial expressions in L1 and L2 across various proficiency levels.** This session (‘session’ or ‘section’?) analyzed the conceptualization of space and spatial-temporal system in one’s L1 and L2. The analysis sought to respond to both research questions, investigating how L2 learners express spatial and spatiotemporal concepts differently between their L1 and L2 and how L1 and L2 spatial and spatiotemporal concepts are expressed differently in L2 learners across proficiency levels. The mean differences between L1 and L2 in each language proficiency group were utilized for further discussion.
The analyses were conducted within two L2-learner groups, CLLs and ELLs. Each language group was divided into four subgroups, based on four proficiency levels: beginning, intermediate, advanced, and native-like. In each L2-learner group, four one-way ANOVA tests were conducted to compare mean differences of expressing six spatial categories between two languages for four proficiency-leveled groups. By using language (Chinese/English) as the independent variable, six dependent variables were tested within each proficiency-leveled group, including spatial/spatiotemporal referents at three dimension planes in their narratives of both Frog and Tuesday.

Because tokens of sideways expressions were very few in both languages and no statistically main effects were found in the category of sideways between language groups, the results of sideways expressions were not included in the analysis.

Within CLL groups. Chinese language learners of English speakers across four proficiency levels had a higher frequency of using physical spatial expressions at horizontal and vertical planes while telling the same story in their native language than in Chinese (Figures 18 and 19; they tended to use more spatial terms referencing time in Chinese storytelling than in their native language, English, except for beginning CLL group (Figures 20 and 21).
Only the expressions of space and time at the vertical plane revealed statistically significant differences between L1 (English) and L2 (Chinese) in Chinese language learners (CLLs) across proficiency levels. Mean frequency differences of spatial and spatial-temporal expressions between L1 and L2 were confirmed by four ANOVA tests in CLLs across four proficiency levels. A main difference in frequency of using vertical physical referents between English and Chinese languages was found in the group of beginning CLLs, $F(1, 8) = 24.52, p < .05$ (Figure 19). Beginning English-speaking CLLs used more vertical terms when referencing physical space in their native language ($M = 3.38\%$) than in the Chinese language ($M = .15\%$).
Although Chinese is not their native language, CLLs across various proficiency levels used significantly more vertical terms to reference time when they spoke Chinese. Due to the lack of vertical expressions in the English temporal system, the mean difference in frequency of vertical referents for time between Chinese and English was found to be statistically significant in all CLL groups: beginning level, $F(1, 8) = 5.82, p < .05$; intermediate level, $F(1, 8) = 8.8, p < .05$; advanced level, $F(1, 8) = 67.06, p < .01$; and native-like CLLs, $F(1, 8) = 32.43, p < .01$. English speaking CLLs across proficiency levels demonstrated statistically higher frequency use of vertical terms in expressing time in Chinese than in their native language, English (Figure 20).

**Within ELL groups.** As confirmed by four one-way ANOVA tests, comparing mean frequencies of spatial references in four proficiency-leveled ELL groups, the main differences were found in the categories of horizontal and vertical expressions. There was not much cross-linguistic difference in mean frequency of physical expressions at both horizontal and vertical planes in ELLs. The only significant difference in using horizontal physical referents was found in the native-like ELL group, $F(1, 8) = 10.42, p < .05$, (Figure 22). English language learners of the native-like proficiency level used more horizontal terms to indicate physical spaces in L2 ($M = .51\%$) than in their native language, Chinese ($M = .13\%$).

Although ELLs in general used more vertical terms in their native language, Chinese, the only significant difference was found in the mean frequency of using vertical physical referents in the intermediate ELL group, $F(1, 8) = 6.2, p < .01$. Intermediate ELLs used significantly more vertical terms referencing physical space in Chinese storytelling ($M = 2.73\%$) than in English storytelling ($M = 1.66\%$).
The results of ANOVA tests confirmed that English language learners in most proficiency levels have significantly higher frequency use in Chinese than in English of spatial terms at horizontal and vertical planes to reference time sequences. Significant mean differences were found between Chinese and English horizontal referents in ELLs at the beginning level, $F(1.8) = 6.33, p < .05$; intermediate level, $F(1.8) = 17.1, p < .01$; advanced level, $F(1.8) = 9.25, p < .05$; and native-like ELLs, $F(1.8) = 10.42, p < .05$ (in Figure 24.). Statistically significant differences between Chinese and English use of vertical terms referencing time also were found in English language learners of beginning proficiency levels, $F(1.8) = 18.11, p < .01$; intermediate level, $F(1.8) = 29.24, p < .01$;
advanced level, \( F(1.8) = 134.87, p < .01 \); and native-like ELLs, \( F(1.8) = 35.02, p < .01 \) (Figure 25.).

**Summary of Quantitative Analyses**

The first part of Chapter 4 was the statistical analyses of the frequency use of spatial terms and spatiotemporal expressions in English and Chinese language samples. Based on the first section of the statistical analysis, spatial and spatiotemporal usages of native language samples between Chinese and English speakers demonstrated statistically significant differences in expressing physical and temporal terms on the horizontal and vertical planes. In general, English speakers had more expressions in describing physical space than Chinese speakers, whereas Chinese speakers used more spatial references for time than English speakers.

Different results between native Chinese and English speech represent a significant set of data for the study of language variations between language communities and L1 influence on the L2 across various stages of second-language acquisition. The nature of the spatial concepts in a language community was reflected on the usages of spatial referents in speakers’ L2 speech. For example, although the category of spatial referents at the horizontal plane showed a statistically significant difference between Chinese and English speech communities (English > Chinese), no significant differences were found in various groups of Chinese-speaking ELLs. Meanwhile, although there were no significant differences in frequency use of vertical physical expressions between Chinese and English speech communities, statistically significant differences of vertical referents were found between two languages in various groups of L2 learners. This was because one’s L2 speech was influenced by their L1, and the level of L2 language
proficiency had influenced their L2 speech in different ways. On the other hand, because
the results showed that the Chinese language community had statically significantly
higher frequency usages of temporal referents at both horizontal and vertical planes,
different degrees of statistical contrasts in various L2 language groups revealed the cross-
linguistic interference across different stages of second language acquisition. The
findings will be discussed further in Chapter 5.

Through qualitative analysis, the following session will further examine how
spatial terms referencing physical and temporal concepts differed between Chinese and
English languages and how these cross-linguistic variations influenced L2 learners’
speech in L2.

**Synthesis**

To investigate language and thought-related cross-language communities and
across-L2 learners, the examination of form-function relationships in Chinese and
English speech was the focus of this study. The first step to compare the form-function
relationship in Chinese and English language speakers and among L2 language learners
was to conduct a quantitative analysis. The quantitative data analysis generated linguistic
forms of spatial and temporal usages in the *Tuesday* and *Frog* storytelling among and
within language groups. The results of quantitative analysis of linguistic forms were
utilized to study the linguistic functions by using a qualitative analysis of the cross-
linguistic variations of spatial-temporal systems between Chinese and English speakers,
an issue that will be discussed in the next chapter.

The results of the quantitative data analyses supported the linguistic relativity
hypothesis and Vygotsky’s framework of thought and language in language learners. In
general, Chinese speakers had higher frequency usages of spatial words than did English speakers during their natural speech. The spatial words in this study were limited to the directional locatives that could be used to reference physical space as well as time sequencing.

Although Chinese language speakers more frequently produced spatial locatives in their native language, the quantitative analysis of each spatial category showed that English language speakers more frequently used directional locatives to indicate physical space, surprisingly, in both horizontal and vertical dimensions. On the other hand, Chinese language speakers more frequently used directional locatives than did English speakers to reference sequence of time. The high-frequency language use of sequencing was found on horizontal planes and on vertical planes.

Two sets of quantitative analyses confirmed the variations in L2 learners’ usage of spatial referents. The first set of analysis was to compare frequencies of spatial terms used by speakers across various language proficiency levels. No main effect was found while comparing usages of directional locatives among English speakers across various proficiency levels during English storytelling. Main effects were found in the usage of directional locatives across different proficiency levels of Chinese speakers during Chinese storytelling. This means Chinese speakers of various proficiency levels used spatial referents differently. However, statistically significant differences were found only in directional locatives referencing time across levels of proficiency of Chinese speakers. Within the category of horizontal locatives referencing time in Chinese storytelling, Chinese native speakers had significantly higher token rates than CLLs of beginning and advanced levels, whereas the intermediate and native-like CLLs had rates
similar to that of native speakers of Chinese. Within the category of vertical locatives referencing time in Chinese storytelling, advanced CLLs demonstrated significantly higher token rates than any another group of Chinese speakers, including Chinese native speakers.

The second set of quantitative analysis confirmed several differences in using spatial referents between L1 and L2 in language speakers across various proficiency levels. Results showed the main effects in occurrences of locatives between CLLs’ L1 (English) and L2 (Chinese) speech. CLLs used more locatives overall in referencing physical space in their L1 than in L2, and they used more locatives referencing time in their L2 than in L1. Among results from pairwise comparisons of each category of directional locatives between CLLs’ L1 and L2, although all CLLs had a higher frequency of spatial referents and lower frequency of temporal referents in L1 than L2, statistical significances were found only in vertical temporal expressions across all levels of CLLs and in vertical spatial expressions in beginning CLLs. These findings were consistent with results from native-language data that native English speakers used both horizontal and vertical locatives more frequently to reference physical space than did native Chinese speakers, whereas horizontal and vertical locatives for time occurred more frequently in native Chinese speakers than in English speakers. Moreover, there is no vertical locative in the English temporal system.

Pairwise comparisons of directional locatives in ELLs’ L1 (Chinese) and L2 (English) speech also were consistent with the findings from native language analyses. Results confirmed that ELLs of all levels have significantly higher frequency productions of directional locatives for time in their L1 than in their L2. Although all ELLs used
vertical locatives more frequently to indicate physical space, statistical significance was found only in intermediate ELLs. The rates between ELLs’ L1 and L2 usages of horizontal spatial referents varied, and the only statistically significant difference between L1 and L2 was found in native-like ELLs, who used more horizontal spatial referents in English than in Chinese.

An advanced level of L2 learners in both languages and across language proficiency levels showed slight regression in rates of using directional locatives in L2 compared to other proficiency levels.

Finally, quantitative analyses on two different stories shed light on the factor that genres had an impact on thoughts and speech. Different rates of using directional locatives between the *Frog* and *Tuesday* stories were confirmed by pairwise comparisons of native-language data. Results showed that native English speakers used significantly more horizontal-spatial referents in *Frog* than in *Tuesday* and used significantly more vertical-spatial referents in *Tuesday* than in *Frog*. While no statistical significance was found in the category of horizontal-temporal referents, native Chinese speakers had a higher frequency use of vertical-temporal referents in *Frog* than in *Tuesday*. These differences reflected on the fact that Chinese and English native speakers had different styles of rhetorical thinking and of language uses. Qualitative findings in Chapter 5 will have a more in-depth discussion on rhetoric in L2 speakers.
Chapter 5

Qualitative Findings

In addition to quantitative analysis of cross-linguistic and cross-proficiency frequency information on spatial and spatial-temporal usages, this study further uses qualitative analysis to assess the degree of linguistic variations across language communities and across L2 proficiency levels. This section focuses on the semantic and pragmatic analysis of spatial terms between Chinese and English narratives of CLLs’ and ELLs’ storytelling. Narrative analysis of form-meaning was conducted to extend the findings to quantitative cross-linguistic and cross-proficiency-leveled analysis by comparing and contrasting the usages of spatial referents between native speakers and L2 speakers of Chinese and English. Narrative analysis is conducted through story scenes from participants’ speech samples in both languages.

The following section will present linguistic (form) and conceptual (function) analyses regarding the locatives and temporal information between two languages and in two stories. Only data samples that showed similar encoding of the same path in both languages, and examples that encode complex paths within one clause, were extracted for analysis. The reason to use form-function analysis was to investigate the differential information in spatial concepts between Chinese and English speakers by encoding directional prepositions and to further to examine how the differences in spatial concepts influenced the expressions of temporal sequence.

Although form-function analyses are based on the contrasts of encoding directional prepositions between native speech and L2 speech, the differential information in this study is not error analysis, as commonly is applied in the area of
studies of second language acquisition. For instance, there was a high-tendency usage of directional locatives in native Chinese speakers when they spoke English, such as ‘fall down’ and ‘climb up.’ Because there also was such usage in native English speakers, and although it occurred less frequently, the overuse of directional prepositions in ELLs’ English narratives was not to be considered an error. Instead, the contrasts of directional expressions provided a window for cross-linguistic variations at the conceptual level and reflected variations in habitual language usages between language communities.

Although speakers of different language types had different focuses of narrative construction, data from this study elicited from two picture books, *Frog* and *Tuesday*, demonstrated that various types of genre and illustrative styles led readers to pay attention to different aspects. Mayer Mercer’s children’s books are based mostly on things that happened to a boy as a little child. According to the genre characteristics defined by *Read-Write-Think* (2006), Mayer’s *Frog* story meets the characteristics of realistic fiction with the characters involved in events that could occur in real life. The genre of *Frog* illustrating a boy searching for his missing pet could be experienced in one’s everyday life. On the other hand, David Wiesner’s *Tuesday* story features “fantasy” and “mystery” fiction characteristics because its genre involves thinking animals that have superpowers, and there are unknown phenomena.

Different types of genre prompt readers to respond to the stories in different ways. Reading fantasy requires a higher level of cognitive demands than does reading realistic fiction (Shine & Roser, 1999). Because the genre in fantasy fiction is less predictable, readers are prompted to go beyond the text to find solutions to problems or to imagine the consequences of various events (Moschovaki & Meadows, 2005). Therefore, when
participants read the *Tuesday* story, they made more attempts than when reading the *Frog* story to try to understand the unknown phenomena and its consequences. Because they were trying to understand imaginary events, when both Chinese and English speakers retold *Tuesday*, their speech was less fluent than when they retold the *Frog* story. Before they understood the entire *Tuesday* story, their narratives focused on describing the setting and movements of characters and on guessing the consequences of events from the emotions of the magical creatures. Because the illustrations in *Tuesday* are rich in vertical movements and time, readers are spontaneously prompted to use vertical expressions and to indicate time; the differences between Chinese and English speakers’ usages of spatial and temporal expressions on the vertical plane were not significant.

However, in examining *Tuesday* data, there were significant differences between Chinese and English speakers using spatial terms to reference time sequence. Because fantasy plots consist of several uncommon or unpredictable events or phenomena, readers must make more of an effort to understand the story. The flow of reading fantasy was not as smooth as reading a realistic one. Therefore, more conjunctive adverbs were employed to transition from a previous theme to the following setting when speakers narrated the *Tuesday* story. Generally, Chinese speakers used significantly more conjunctive adverbs than English speakers. Therefore, the qualitative analysis of *Tuesday* focused on examining rhetorical speech with an emphasis on spatial referents for sequencing adverbs.

On the other hand, with realistic fiction books, the discrete events led readers to achieve a coherent understanding of the entire story with little cognitive engagement. In other words, realistic fiction requires a lower level of a thinking manner than than does
fantasy. They focused on the details in the story and followed the illustrations to reconstruct it. Chinese-speaking and English-speaking participants made little effort to understand the entire Frog story by relating the events from the illustrations. Their speech appeared more inclined to reconstruct the Frog story based on their understanding of the story by following the illustrations. The linguistic forms in Frog retellings reflected Chinese and English speakers’ typical language use. Therefore, the qualitative analysis of the Frog story consisted of cross-linguistic comparisons on various locatives at vertical and horizontal dimensions.

**Vertical Sequence Adverbs in Tuesday**

Tuesday, an almost wordless book, is told in detailed illustrations with only a few captions and describes frogs that mysteriously rise out of their pond on floating lily pads on a Tuesday evening. The flying frogs invade a village and encounter a number of startled residents before dawn arrives. Tuesday consists of five scenes (Figure 29): (a) beginning, the departure from the open space to the neighboring community; (b) rising action, playing around people’s houses; (c) conflict with a dog; (d) climax, back to reality; and (e) resolution, supernatural power in animals reoccur.

**Figure 26. Storyline in Tuesday**

<table>
<thead>
<tr>
<th>Scene 1: Beginning</th>
<th>Picture 1</th>
<th>Picture 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture 3</td>
<td>Picture 4</td>
<td></td>
</tr>
</tbody>
</table>
Scene 2: Rising Action

Scene 3: Conflict

Scene 4: Climax

Scene 5: Resolution/Ending
Time is the only text given to reveal different segments (scenes) of the story, as shown in Figure 29 Pictures 1, 5, 9, and 14, including ‘Tuesday evening, around eight,’ ‘11:20 p.m.,’ ‘4:38 a.m.,’ ‘Next Tuesday, p.m.’ Almost every initial picture of each scene was denoted by a time caption. Because of the captions in the first picture of each scene, all readers were explicitly prompted to use time phrases to begin the segments. Little variations were found within languages, and differences between languages were mostly word order and the spatial expressions of time, such as ‘11:21 p.m.’ vs. ‘晚上 11 點 21 分 (late-up 11:21)’ and ‘next Tuesday, 7:58 p.m.,’ vs. ‘下星期二晚上 7 點 58 分 (down-week-2 7:58).’ The narrations of the temporal usages on those pages were standard across language communities and across L2 proficiency levels. Both Chinese and English speakers retold these scenes with similar narrations. Speakers were prompted to indicate an explicit time to introduce every new scene. Being prompted by the captions, both native Chinese speakers and CLLs opened the story by saying 星期二晚上 8 點 ‘Tuesday evening 8 o’clock’ or 礼拜二晚上大概8點(左右) ‘Tuesday evening around 8 o’clock’ (as Picture 1, Figure 29). To introduce the rising of the event in second scene, all participants denoted 晚上 11 點 21 分 ‘11:21 p.m.’ in Picture 5 to articulate the moment that a man had a midnight snack. When participants moved to the third scene, they found conflicts in the story and were surprised by seeing the frogs chased by a dog, as in Picture 9. Most of the participants began to describe the illustration and then were reminded to indicate time, as in the caption, 早上 4 點 38 分 ‘4:38 a.m.’ Until the participants continued the story by reading the last caption of the ending scene (Figure 29, Picture 14), 下個星期二晚上 7 點 58 分 ‘next Tuesday 7:58 p.m.’ and seeing a shadow of a flying pig, they realized that the end of the story did not end the mystery.
Language samples elicited from these pictures represented the nature of cross-linguistic differences in using spatial terms to reference time. Explicitly prompted by time captions in these pictures, cross-linguistic variations of using directional locatives for temporal referents were found between Chinese and English languages. The Chinese language consists of extensive vertical spatial terms in referencing time of the day, week, and month. On the other hand, vertical referents for time are omitted in the English language. When Chinese native speakers retrieved time terms in English, no confusion occurred at the word level. Because there is no system of vertical temporal references in English during second language acquisition, vertical temporal referents were not in ELLs’ word bank. However, because there is a lack of vertical references in the English temporal system, some CLLs did not retrieve the correct vertical locatives to reference temporal sequences. For instance, some CLLs struggled with the Chinese terms for a.m. versus p.m., ‘last Tuesday’ versus ‘next Tuesday’ by selecting between 上午 ‘up-noon’ versus 下午 ‘down-noon’ and 下個星期二 ‘down-Tuesday’ versus 上個星期二 ‘up-Tuesday.’ Speakers were most likely to be aware of their errors and self-corrected within a short period of time.

**Horizontal Sequence Adverbs in Tuesday**

The *Tuesday* story consists of a mystery that requires readers to look for clues and put together the pieces of the puzzle. Mysteries require that the audience make more effort to develop the storyline. Although some captions of time in the scenes help reveal the mysterious events happening throughout one Tuesday night, most of the scenes are wordless, and readers need to interpret the development of the story from illustrations. Compared to the speech prompted by the captions, narrations elicited by wordless
illustrations were considered as natural speech. To incorporate the storyline, the participants used sequence adverbs extensively, such as 然後 ‘afterward,’ to connect between events or to introduce consequences.

As shown in the quantitative data analysis (Figure 8), in their natural speech, native English speakers used fewer horizontal and vertical sequential adverbs than native Chinese speakers. Qualitative analyses of Chinese and English L2 speech in spatial and spatial temporal contexts presented in the previous session demonstrated some qualitative changes of spatial expressions between L2 speakers and L2 speech across language proficiency levels. While time terms in Chinese were indicated mostly at a vertical plane (i.e., 晚上 ‘evening,’ 下午 ‘afternoon,’ 下個星期二 ‘next Tuesday’), sequential orderings were conceptualized mostly on a horizontal plane in both the Chinese and English languages (i.e., 然後, 後來, 以後 ‘afterward’). The following analysis of sequential or conjunctive adverbs on the horizontal plane focused on examining the frequency usage of 然後 ‘then’ between Chinese and English speakers’ natural speech in Chinese Tuesday stories to study cross-linguistic variations of sequential expression.

The narrations elicited from Tuesday Pictures 3, 6, 10, and 12 (Figure29) demonstrated that the frequencies of using the conjunctive adverb 然後 ‘then’ were different between Chinese and English native speakers. Chinese native speakers used more 然後 ‘then’ than English native speakers. In each scene in the Tuesday story, readers tended to use 然後 ‘then’ to transit from one scene to the next at the second or third picture. Pictures that elicited higher frequency of 然後 ‘then’ are:
(a) Picture 3 (third picture in Scene 1): In this introductory scene, the frogs floated near the pond and then flew to the town center in picture 3.

(b) In Picture 6 (second picture in Scene 2): The second part of the storyline was the rising of the plot. The second picture of the rising scene illustrated how the frogs flew by the houses and showed an interest in human’s houses.

(c) In Picture 10 (second picture in Scene 3): Scene 3 illustrated a conflict brewing in the storyline. The second picture of this scene illustrated that the frogs took revenge by chasing the dog.

(d) Picture 12 (second picture in Scene 4): Scene 4 brought the story to a climax, with the world returning to normal after sunrise. The second picture of Scene 4 illustrates the frogs falling back to the pond, which signals the transition of the flying frogs returning to their normal life.

To relate these settings in the storyline, Chinese native speakers demonstrated the habitual usage of conjunctive or sequential adverbs between paragraphs, whereas English native speakers did not find it essential to use a sequence adverb during the storytelling. The following section is to further analyze the differences of sequential expressions between Chinese and English speakers.

The preliminary findings demonstrate similarities in frequency rates of using the conjunctive adverb 然後 ‘then’ between Chinese and English native speakers while narrating Pictures 7, 11, and 13 (Figure 29). A common feature found in these pictures was that they demonstrated a dramatic transition in the storyline. Picture 7 signals a change of setting, from outdoor to indoor, of someone’s residence. Picture 11 illustrates the dramatic change of the frogs’ status after they lost the magic power of flying. Picture
13 brings readers from a fantastic to a realistic setting by illustrating police and media investigating the evidence remaining from the magic night of flying frogs.

Although each first picture of the scene displayed a transition to a new scene, because the beginning of each scene was introduced by the caption denoting time, readers were explicitly prompted to begin a transition to a new scene by the indication of time. Conjunctive adverbs were redundant if time was indicated. Therefore, no sequential adverbs were found in these pictures consisting of captions of time. However, Figure 29, Pictures 7, 11, and 13 demonstrated without captions the dramatic transitions in the storyline. In these cases, readers needed more time to respond to the transitions between settings and to understand the changes. To reconnect the storyline, speakers naturally use sequence phrases to make the transition. Readers rely on conjunctive adverbs to create complex relationships between events. Sequential adverbs allow readers not only more time to make sense of the story but also help them understand the story’s sequence. Applying sequential adverbs during the transitional setting seemed to be common in cross-linguistic rhetoric.

The *Tuesday* story related a series of magical and fantastical scenes in one night. The illustrations had a direct influence on readers’ interpretation of the story. The narratives from *Tuesday* showed more direct responses from pictures than did the *Frog* story. On the other hand, the illustrations in *Frog* were close to reality, which made more sense to readers. The readers were able to focus on interpreting the story by relating the illustrated events. Therefore, language samples used to retell *Frog* demonstrated: (a) language uses were more sophisticated in *Frog* than in *Tuesday*, and (b) there were more
variations in language uses between languages and across proficiency-level groups, which will be discussed in the following sections.

**Vertical Locatives in *Frog, Where are You?***

Data samples elicited from *Frog* showed that native Chinese speakers used extensive locatives in their native language, and such habitual language use has been carried to their L2. By contrasting English *Frog* storytelling in Chinese-speaking learners of English (CLLs) to native English speakers, CLLs had significantly higher frequency use of *up-down*, indicating physical space or modifying an action. This was considered an overuse of a language structure. The overuse of vertical prepositions was elicited by the pictures consisting of movements with an explicit vertical path, which were shown in Pictures 6, 11, 12, 14, 15, and 17 (Figure 30).

**Figure 27. Vertical Locatives in *Frog, Where Are You?***

![Picture 6](image1) ![Picture 11](image2) ![Picture 12](image3)

![Picture 14](image4) ![Picture 15](image5) ![Picture 17](image6)

While Chinese and English speakers perceived a vertical movement, the focuses of their discourse were different. To determine the variations of language use in the
perception of vertical space, Pictures 6 and 14 in the *Frog* story (Figure 30) were purposely selected for comparisons and contrasts of referencing vertical space between the Chinese and English languages. The rationale of analyzing the discourse elicited from these scenes is due to the pictures explicitly presenting vertical paths of movements.

**Vertical locatives in *Frog* Picture 6.** The narratives elicited by Picture 6 in *Frog* (Figure 30) revealed a linguistic relativity between two languages and among five groups of language proficiency levels. Picture 6 in Figure 30 represents a scene that the dog is falling out of a window with a jar on its head. Native Chinese speakers focused on describing the movements and a direct visual line during storytelling. Some 8% of the native Chinese speakers used 下 xià ‘down’ to indicate the movement of the dog’s falling, with various verbal phrases, such as 掉下來 ‘drop down,’ 摔下去 ‘fall down,’ and 跳下來 ‘jump down.’

When native English speakers described the scene in Picture 6, the most commonly used verbal phrases included *fall out of the window* and *jump out of the window*. Only two of 21 utterances consisted of vertical locatives, which are *accidentally saw down onto the ground, crashing to the ground* (in narrative 291), and *Gregory fell right out the window, came crashing down to the ground* (in narrative 124). For English speakers, the verb itself, such as *fall*, conveys the track of motion. To describe the direction of the movement or path seemed redundant.

The way speakers perceive the world in their native language is carried to their L2 speaking. Chinese-speaking ELLs’ habitual vertical expressions in describing vertical motions and paths carried to their L2 speaking. Among ELLs’ descriptions of the falling dog in Picture 6 (Figure 30), seven of 17 English utterances contained vertical locatives.
Except for one ELL speaker, who used *fell on the ground*, the most frequently used phrase in describing vertical movement in English was *fall down*, which definitely was a direct influence from the Chinese language use.

On the other hand, when English-speaking CLLs described the scene in Picture 6 (Figure 30), a low percentage of speakers, four of 20, used vertical locatives in their Chinese storytelling. In the vertical expressions during Picture 6 storytelling among CLLs, almost all native-like CLLs used *掉下來 ‘fall down’* in their speech. Only one native-like CLL did not use a vertical locative in this scene because he omitted the description of the falling dog. Only one non-native-like CLL speaker used 突然他的狗跌下來 ‘suddenly, his dog fell off’ (in narrative 289) to describe Figure 30, Picture 6. Interestingly, This participant also was one of the few CLLs who used vertical referent in Figure 30, picture 6, to describe the movement path of the dog, as in *accidently fall down onto the ground, crashing to the ground* (in narrative 291). By comparing his speech in both Chinese and English, his Chinese speech might have been influenced by the thinking process in his native language. When bilingual (native-like) Chinese and English speakers talked about the scene in Figure 30, Picture 6, there was no cross-linguistic interference in their discourse.

**Vertical locatives in Frog Picture 14.** The narratives elicited by Picture 14 in *Frog* (Figure 30) represent the opposite directional movement from Picture 6. Although Picture 14 itself does not demonstrate the movement as in Picture 6 (Figure 30), the storyline led the speakers’ vision line to move from Picture 13, the boy at the bottom of the rock, to Picture 14, the boy climbing to the top of the rock (Figure 31). Cross-linguistic data demonstrated that Chinese and English speakers were different in using
vertical locatives in this picture, and this difference revealed that speakers from different speech communities embraced different mental space. Chinese speakers tend to use prepositions to emphasize the path—the relative position of the movements. On the other hand, English speakers used verbs to describe the path of the movement. The difference revealed varied (?) space lines between satellite-language and verbal-language categories.

**Figure 28. Continuous Scene of Vertical Path in *Frog, Where Are You?***

The first difference between English and Chinese speakers was that for almost all native Chinese speakers, the narrative center for this scene was vertical movement, getting up to the rock. Only one of 20 native Chinese speakers omitted this movement during Chinese storytelling, and two of the 20 omitted this scene during English storytelling. All native Chinese speakers described the movement to the top of the rock by using the directional preposition *up* or *on* in English and 上 ‘up’ in Chinese. Among native Chinese speakers’ verbal phrases, 爬到石頭上 ‘climb on the rock’ was the most frequently used, and the rest were some variation, such as 爬上 ‘climb up,’ 站到石頭上 ‘stand on the top of the rock,’ and 跑到石頭上 ‘run to the top of the rock.’ Both climb *up* and climb/stand *on the rock* were used equally by Chinese-speaking ELLs across proficiency levels when they described Picture 14 (Figure 31) in English.
As shown in Figure 31, Pictures 13-15 presented a continuous scene of a vertical path of the boy’s movement toward the rock. Speakers tended to describe the pictures in a holistic way. To break narratives into designated pictures was not always possible.

During English storytelling, 11 of 21 native English speakers skipped the description of Picture 14. Among the 11 utterances of Picture 14, most speakers used *climbs up onto a rock* or *gets/climbs/looks on top of rock*. Similarly, when these English-speaking CLLs narrated this scene in Chinese, 12 of 21 English-speaking CLL speakers omitted the description of Picture 14. Among the Chinese utterances about Picture 14, only one native-like CLL used the directional preposition *上* ‘up’ to indicate the location of the boy, 那個小男孩在大石頭上 ‘the little boy is on the top of the big rock.’ The rest of the utterances among the CLLs focused on verbal phrases without locatives as in English utterances, such as 爬一個石頭 ‘climb a rock.’ For English speakers, Picture 14 signaled the transition of a state in the series of the storyline as in Pictures 13-15 (Figure 31). Because the state of Picture 14 (on the rock) was included in Picture 15, English speakers tended to merge Picture 14 to be part of Picture 15. Meanwhile, it was dramatic for English speakers to find out that the tree was in fact the antler of the deer.

**Horizontal Locatives in Frog, Where are You?**

The rationale of selecting Picture 21 in *Frog* for qualitative analysis was because Pictures 19, 20, and 21 illustrate the sequence of an ongoing physical and spatial movement, which prompted readers to pay attention to the physical path of the boy and the dog. Meanwhile, the series of the related movements prompted readers to use sequential terms to connect between pictures. Finally, the image of the boy and the dog
leaning toward the log led readers to predict the following scene and the development of the story.

**Figure 29. Continuous Scene of Horizontal Path in *Frog, Where Are You?***

![Figure 29](image)

**Horizontal locatives in *Frog Picture 21***. There was a significant difference between Chinese and English speakers when they first looked at Picture 21. The English speakers’ narrations of Picture 21 focused on the physical space of objects. In other words, native English speakers did not relate the series of events and mention the expression of emotion of the boy and the dog. When English-speaking learners of CLLs described Picture 21 in both Chinese and English, they focused on the movement of the boy and the dog looking over the log. Meanwhile, CLLs integrated obvious emotion in their speech. They tended to predict the upcoming events and project the characters’ feeling. The prepositions that English speakers used for Picture 21 to connect the log and the boy with the dog were mostly *over, around, or on*. Only two of 20 CLLs used the horizontal locative *behind* to narrate Picture 21 in their native language, and both speakers are intermediate CLL, *he looks over behind the tree stump* (in narrative 237) and in one advanced CLL, *with his dog to look behind it* (133). When CLLs narrated Picture 21 in Chinese, they used more horizontal locatives than in English, and only four of 20 speakers used 後 *hòu* “back” to reference the log. For example, a native-like CLL
said, 他們在枯樹後面繼續找一找他的蛤蟆 “They are behind the tree trunk continuing looking for his toad.”

While reading Picture 21 in *Frog* in both Chinese and English languages, Chinese-speaking ELLs paid more attention to the motive of the boy and the dog leaning over the log. In other words, what the boy and the dog were figuring out *behind* the trunk interested Chinese speakers the most. When ELLs used their native language to narrate Picture 21 in *Frog*, seven of 20 speakers used the locative 後 *hòu* “behind/back” to reference the log, such as *who made the voice behind the woods* (in narrative ‘010’), and *they looking for the frog behind a tree* (in narrative 179) in beginning ELLs, and *they sneaked in the back of the tree* (in narrative 207) in advanced ELL. While most Chinese speakers used *behind* to indicate the related location between the boy with the dog and the log, only four native Chinese speakers used 上 *shàng* “on/up” in both of their Chinese and English narratives, such as *they both went over up to the logs, look for something* (in narrative 213), *he climb on the wood* in intermediate ELLs, and *decided to try to sneak up behind the log* (in narrative 224) in bilingual speakers. In this picture, Chinese speakers were prompted to use more *front-back* locatives to reference space, but English speakers were prompted to use more *up-down* locatives to reference space. The different habitual language uses in conceptualizing the physical space reflected different worldviews between Chinese-speaking and English-speaking communities. The following paragraphs discuss more differences between Chinese and English speakers’ Chinese narratives.

The major differences between native Chinese and English speakers’ speech describing Picture 21 in *Frog* in Chinese was that the directional lexicon 後 *hòu* “back”
occurred extensively in native Chinese speakers. Unlike most native English speakers who tend to focus on current scenes by using the prepositions over/around to describe the physical location between the log and the boy with the dog, when they saw the boy and the dog hanging over the log, they were more interested in the objects behind the log and the unknown future. The locative 後 hòu “back” to further predict the invisible upcoming event and to connect the series of event. As shown in Examples (35-38), the locative 後 hòu “behind/back” occurred extensively as a locative referencing physical space and a temporal adverb referencing sequence of the events in native Chinese speakers’ speech.

(35) a. 然後他發現了;他在樹幹,斷掉的樹幹背後,發現了兩隻青蛙,然後他躡手躡腳的爬過那個樹幹 (narrative 178, beginning ELL)
   ‘Then, he finds out; he finds the trunk, behind the broken trunk, he finds two frogs. Then he stealthily climbs over the trunk.’

b. 然後他們就上,就坐在那個木頭上面,然後慢慢慢慢爬爬爬就上岸了 (211, beginning ELL)
   ‘Then, they climb up, sitting on that log, then, slowly crawl up to the shore.’

(36) a. 結果,果然不出他所料,他爬上樹,他悄悄的看著樹的後面 (024, intermediate ELL)
   ‘As a result, as expected, he climbed up the tree, and he quietly looks behind the tree.’

b. 然後呢,他一定是發現了什麼動靜,他趴到那個枯樹幹,然後呢,爬過那個枯樹幹 (071, intermediate ELL)
   ‘Then, he must find something. He leans at the tree trunk and then climbs over the tree trunk.’

(37) a. 到處找一找翻一翻…他在樹的後面 (259, advanced ELL)
   ‘He searches and tosses everywhere …behind the tree.’

b. 他們在想說,哇,青蛙可能會在樹後面,所以,那個小男孩兩根腳就突然出現在樹後面,然後再找 (039, advanced ELL)
   ‘They think the frog might be behind the tree, so the boy’s two legs suddenly appear behind the tree and then continues searching.’

(38) a. 然後小朋友和小狗就用這個木頭(Hx)爬上岸 (222, bilingual ELL)
‘Then, little boy and the dog use this log to climb up to the shore.’

b. 然後，後來，就轉過來 (157)
‘Then, turn over’

As native Chinese speakers focused on the details during storytelling, they developed the stories by describing the objects, movements, and the underlying emotions and motives in the characters. In Example (35a), a novice Chinese-speaking English learner (ELL) used an adverb 躁手躀腳 “with light steps and soft movements of one’s hands” to modify the action of climbing over the tree. An advanced ELL speaker tried to extend the searching process prior to the finding by saying 到處找一找翻一翻 “search a bit, toss a bit everywhere” as in Example (37a). In Example (38a), a bilingual speaker emphasized the process that the boy and the dog used the log as an instrument. 然後小朋 友和小狗就用這個木頭(Hx)爬上岸 “then, the little friend and the little dog use the log to climb up to the shore.” These are the examples that when native Chinese speakers develop a story, they tend to focus on details and expand the plot beyond the scene.

Chinese speakers also tend to project characters’ mental state. In Example (36a), what an intermediate ELL described in the series of Pictures 19-21 was the psychological analysis of the boy’s path of movement. In addition to describing the movement, 爬上樹 “climb up tree,” the speaker projected the boy’s prediction by saying 果然不出他所料 “just as he predicted.” The speaker further detailed how silently the boy approached and looked over the trunk, 悄悄的看著樹的後面 “quietly looking at the back of the trunk.”

Another example from an intermediate ELL also included an extensive description of the transitional searching movement. As in Example (36b), the speaker projected the boy’s finding by laying out three stages in this series of events: (a) 他一定是發現了什麼動靜
“he must sense some sort of movement,” (b) 他趴到那個枯樹幹 “he leaned over the trunk,” and (c) 然後呢。爬過那個枯樹幹 “then, he climbed over the trunk.” Another advanced ELL used complex clauses to describe the invisible scene behind the tree and how it triggered the main characters’ curiosity. In Example (37b), the speaker transited the mental state of the main characters, 他們在想說, 哇, 青蛙可能會在樹後面 “they were thinking, uh, the frog might be behind the tree” to the action illustrated in Picture 19, 所以, 那個小男孩兩根腳就突然出現在樹後面, 然後再找… “as a result, the boy’s two legs suddenly appeared behind the tree, and then continue searching…” The mental state is essential for Chinese speakers because they consider the thinking process as a fundamental element of the development of the story.

In Pictures 19-22, the storyline represents a dramatic transition in the plot; extensive temporal adverbs occurred during the Chinese storytelling. It is not uncommon to have a series of sequential adverbs, 然後 in Chinese speakers’ narrations. As shown in Examples (35-38) in Picture 21 and 14, adverbs 然後 ránhòu “then” occurred in twenty native Chinese speakers’ narrations. Native Chinese speakers consider using transitional or sequential adverbs important in their speech. This may be because of the lack of tense markers in the Chinese language, a topic that will be discussed in the next chapter.

Synthesis

The results from quantitative data analyses were supported by in-depth qualitative analyses of narratives in Chinese and English speakers. This chapter related linguistic form and concept (function) in speakers from different language communities. By comparing cross-linguistic variations of using spatial and temporal referents between the Chinese and English languages, the data revealed that people from different speech
communities perceive the world differently. The rhetoric and sequencing of events were influenced by speakers’ worldviews.

The qualitative analysis revealed a critical finding that different types of genre fostered different levels of thinking processes in speakers. Speech stimulated by *Frog*, realistic fiction, was closer to everyday speech, and the thinking processes were more linear. Speakers focused on relating events in the story. On the other hand, when speakers read *Tuesday*, fantasy, the thinking process was more complex. While speakers tried to put puzzles together, the focus was on problem solving. Hence, the speech flow appeared not as fluent as their natural speech. As a result, the frequency rates of each category of directional locatives were different between the *Frog* and *Tuesday* narratives between two language-speaking communities.

Results from the qualitative narrative analyses revealed that L2 speakers’ L1 habitual language use was carried to their L2. This finding was confirmed particularly by the *Frog* narratives between speakers’ L1 and L2. Because *Frog* is realistic fiction, the narratives were revealed as more natural speech in speakers’ daily life. The data from *Frog* storytelling provided cross-linguistic variations between different speech communities. The qualitative analysis of each illustration between languages in the *Frog* narratives confirmed the findings from quantitative analysis.

Differences between Chinese and English native speakers were found: First, Chinese speakers focused on details in the illustrations, whereas English speakers described a linear story line. Chinese speakers considered the descriptions of characters’ motives and emotions as an important aspect that needed to be included in the storytelling.
Hence, Chinese speakers spent more time during storytelling, detailed the scene of the illustrations, and made efforts to predict the development of the stories.

Second, because the Chinese language lacks tenses, Chinese speakers relied heavily on temporal adverbs to relate events. Most temporal adverbs in Chinese are the metaphors of spatial referents. Both characteristics have been found in both the Frog and Tuesday storytelling. Chinese native speakers paid attention to details, and they use temporal adverbs extensively, characteristics that carries to their L2 speech.

Third, findings also showed that less fluent speakers in both languages tend to use more sequential adverbs to connect thoughts. This tendency was revealed in the Tuesday storytelling. Due to the high complexity of the story, speakers needed more time to process their thoughts during storytelling. Thus, the rates of using temporal adverbs were high in both language communities. Because sequential adverbs in Chinese are mostly directional locatives on the horizontal and vertical planes, data from the Tuesday narratives demonstrated a high frequency of the use of directional referents for time. The results of the analysis also showed that sequential adverbs were more likely to occur at the beginning of each new scene in Chinese native speakers to relate the previous setting to the next one.

These findings were critical to understanding thoughts and speech between speech communities and among L2 speakers, which could not be studied without a qualitative narrative analysis. The rhetoric of the storytelling provided a window to study one’s thinking process. By analyzing directional locatives in different dimensions for space and time, the findings from this chapter confirmed that Chinese and English speakers paid attention to different elements while speaking. The differences are due to their linguistic
differences (i.e., lack of tenses) and to a different way of perceiving the world (i.e., detail oriented and curious about an unknown future). Although L2 speakers with higher language proficiency levels had gradually adapted L2 linguistic forms in the L2 speech, their L1 habitual pragmatic language use was found to be persistent, even in advanced and native-like ELLs.

The findings from this chapter are consistent with the current frameworks in thought and language. Differences of linguistic forms and functions between Chinese-speaking and English-speaking communities are what the linguistic relativity hypothesis emphasized. Furthermore, L1 thinking in L2 speaking has been revealed in an analysis of the data. The thinking process during L2 speech and the interchange process between L1 and L2 are what Vygotsky studied—the development of thought and language. The next chapter concludes the findings and further discusses sociocultural aspects of language and thought.
Chapter 6

Discussion

The human concept of time also is based on the concept of space, although commonalities and differences exist between the concepts of time and space (Clark, 1973). The conceptions of spatialized metaphors to time at the horizontal dimension are more common across languages. English has only horizontal temporal terms, while Chinese has horizontal and vertical time representations. The difference between Chinese and English linguistic structures of spatial metaphors has caught the attention of sociolinguistic and psycholinguistic researchers. Extensive studies on linguistic relativity have been conducted to investigate the distinct linguistic feature of vertical, spatial metaphors for time in Chinese but not in English (Boroditsky, 2001; Chen, 2007; Scott, 1989). It has been debated for more than a decade whether vertical spatial metaphors influenced Chinese speakers’ conception of a vertical timeline (Gu, Mol, Hoetjes, & Swerts, 2013). Boroditsky and her colleagues (2001, 2011) claim that when using spatial metaphors to indicate time, English speakers think of time horizontally, whereas Chinese speakers often think of time vertically. Other researchers (e.g., Chen, 2007; January & Kako, 2007) found that Chinese speakers more often conceptualize time at a horizontal dimension than at a vertical dimension.

To explore the differences between Chinese and English speakers’ conceptions of space and spatial-metaphors for time, this study analyzed the occurrence of spatial and temporal terms in the natural speech of Chinese-speaking English learners and English-speaking Chinese learners. Further, this study examined how second language (L2) learners’ usages of time and space in L2 is different from their first language (L1), as
well as from native speakers of the target language. In particular, the results of this study attempt to answer the following research questions:

1) How do Chinese and English speakers contextualize and express spatial-temporal conceptions differently in their L1? To what extent does habitual language use reflect on different dimensions of spatial-temporal metaphors, including the vertical, horizontal, and sideways planes?

2) To what extent does L1 influence the development of spatial-temporal conceptualizations in L2 across different proficiency levels? How do Chinese-language and English-language learners conceptualize spatial-temporal metaphors, including the vertical, horizontal, and sideways planes, while speaking in their target languages?

The first section of this chapter discusses the findings of comparing and contrasting the usage of spatial and temporal referents on different dimensions between English-speaking learners of Chinese (referred to hereafter as CLLs) and Chinese-speaking learners of English (referred to hereafter as ELLs). As discussed in Chapter 4, the producing rates of directional referents on various dimensions are different between Chinese speakers and English speakers. The differences between Chinese speakers’ and English speakers’ conceptualization of space have been found in their expressions of physical space and temporal sequences. Quantitative data analyses in Chapter 5 further yielded important findings that Chinese-language and English-language speakers paid different attention to rhetoric structures during storytelling.

The second section of this chapter discusses the findings from both quantitative and qualitative analyses of cross-linguistic (word left out?) and cross-proficiency (word
left out?) differences between Chinese speakers’ and English speakers’ use of spatial and temporal systems in their first and second languages. In particular, it discusses how one’s worldview in L1 influences L2 speech. Native language data in Chinese and English are baselines for studying L2 language data. The findings from both quantitative and qualitative data analysis showed various degrees of L1 thinking in L2 speaking across language proficiency levels. The results of L1 thinking in L2 speaking align with the linguistic relativity hypothesis that the speakers’ L1 worldview influences L2 speaking. The development and transformation of thought and language between speakers’ L1 and L2 is consistent with Vygotsky’s (1987) discussion of this relationship.

The last section of this chapter discusses how this empirical study on English-language and Chinese-language learners provides implications for language education. The qualitative analysis sheds light on how genres play a critical role in reflecting one’s perception of the world from a cross-linguistic and cross-cultural perspective, which will be an area to further explore. The findings also indicate various areas to explore in future research, including various approaches of narrative analysis to study language-related issues.

**Cross-linguistic Variations in Spatial and Temporal Representations**

This study examines different linguistic contexts (form) between Chinese speakers and English speakers, particularly in spatial and temporal conceptions. The results demonstrated distinct linguistic contexts in representing mental space and mental timelines between two language communities. Although extended studies (e.g., Boroditsky, 2001; Boroditsky, Fuhrman, & McCormick, 2011) hypothesize that a vertical bias exists in Chinese speakers due to cross-linguistic differences in using
vertical spatial metaphors in the Chinese language, their results demonstrate no direct correlation between vertical bias found in Chinese speakers’ natural speech. Findings from the current study demonstrate a higher frequency of English speakers using horizontal and vertical locatives than Chinese speakers, but Chinese speakers employed significantly more horizontal and vertical mental timelines than did English speakers. Furthermore, Chinese speakers and English speakers used significantly more vertical locatives than horizontal locatives. As mentioned in Chapter 5, looking at the same picture, Chinese speakers were prompted to use more front-back locatives to reference space, whereas English speakers were prompted to use more up-down locatives to reference space. The findings are consistent with recent studies (i.e., Beller et al., 2012; Chen et al., 2013), claiming no direct relationship between the perception of space and conception of spatialized time metaphors.

The perception that temporal expressions are based on spatial terms is due to the fact that a spatial domain is concrete and a temporal domain is abstract (Bateman et al., 2010). The entities associated with space are concrete objects, while those associated with time are abstract events. The current findings show that English used more general spatial expressions in natural speech, whereas Chinese used more spatial metaphors for space. The following sections discuss how different linguistic characteristics between Chinese and English yielded different conceptions of spatialized metaphors for time representations in Chinese speakers and English speakers and how these conceptions carried to their L2 thinking and speaking.

**Narrative metaphors in Chinese.** Qualitative results from the current study demonstrate that Chinese speakers tend to relate complex information to talk about an
image, while English speakers’ description of a story event or scene is more linear. For instance, Chinese speakers prefer to project a mental state of the characters in the story, to involve their opinions and emotions, and to employ vivid descriptions of the image and the movement paths during storytelling. On the other hand, English speakers’ speech is more concrete and concise in describing an image.

According to Gibbs (1994), metaphorical expressions present a very high communicative function in language. There are three main reasons for such high communicative function: (a) metaphors provide a way of expressing ideas that are extremely difficult to convey using literal language, (b) metaphors provide a particularly compact means of communication, and (c) metaphors help the individual to capture the vividness of our phenomenological experience due to the capacity of metaphors to convey complex configurations of information (Gibbs, 1994, p. 125). Thus, Chinese speakers focus more on the metaphorical aspects of the narrative sequence while English speakers focus more on the concrete aspects of the same narrative sequence.

The different ways of perceiving images during storytelling have been carried to one’s L2 speech. Chinese native speakers’ highly metaphorical language use has been carried to their L2 speech. Native Chinese speakers use many descriptive terms to describe an image in their L1 and L2. Therefore, commonly found in Chinese speakers’ discourse is a detailed description setting the scene. For example, a novice Chinese speaker started the Frog story by narrating “从前从前, 在一个小小很温馨的小房子里面” “a long long time ago, in a tiny tiny cozy little house ….” In her English storytelling, she began the story by saying, “Long long time ago, in a forest, there is a cute house…” Compared to native Chinese speakers, English speakers’ narratives are more concrete in
both L1 and L2. Hence, Chinese speakers are more metaphorical than English speakers in speaking and thinking. Linguistic relativity can explain this assumption: Speakers’ L1 influences the thinking process at a more abstract level in their L2 due to the nature of concept formation in L1 is carried in analyzing concepts in L2, and vice versa (Slobin, 1996).

**Lack of verb conjugations in Chinese.** By assessing the language data from the current study, I suggest that the rationale for why Chinese speakers employ more descriptive information in articulating their projection of images than do English speakers is because of the cross-linguistic difference of constructing tense. Because English verb conjugations provide explicit tense and aspect information (Chen et al., 2013), English speakers rely on verb conjugations to convey the state and movement path of the characters or objects in the story. For example, the verb “climb” conveys trajectory, moving upward. For English speakers, to link verbs with locatives seems redundant. Furthermore, English tenses are carried out by verb conjugations. Therefore, English narratives are more concise because of the usage of verb conjugations.

On the other hand, Chinese grammatical rules are more concise than in English, and there is no verb conjugation in the Chinese language. This explains why Chinese speakers apply more linguistic context to express the same idea than do English speakers. The linguistic context has been assessed in this study by analysis of spatial trajectory and spatialized metaphors for time. Chinese speakers frequently employ time terms as part of the sentence to indicate time frames. Sequential adverbs are one of the most favored time terms for Chinese speakers to convey time frames or to connect events. Most sequential adverbs in Chinese are spatialized time metaphors, such as 從前‘from-front’ ( awhile ago),
以前‘according-front’ (before), 然後來 ‘so-back’ (then), and 以後‘according-front’ (thereafter). The sequential adverbs are highly productive in Chinese discourse. Chinese speakers rely on temporal terms to transit between sentences and events.

Second-language speakers carry their L1 habitual language use into their L2 speech. Chinese-speaking ELLs use more sequential adverbs in their English speaking than do native speakers. The extensive uses of sequential adverbs influenced their thinking processes in their L2. When they speak in English, they still think of temporal sequencing and frequently use sequential adverbs, such as “then,” to transit between sentences or to relate events. On the other hand, when English-speaking CLLs speak Chinese, they tend not to use as many temporal metaphors as do native speakers. Their lack of sequencing adverbs or time terms in ELLs’ Chinese discourse is because their L1 does not train them to pay special attention to time frames and the necessity of presenting sequencing in their thinking and speaking process.

Multiple perceptions in Chinese. It is commonly believed that historically vertical writing systems and the value of social hierarchy contribute to the pervasive use of vertical representations of timelines in the Chinese language. The Chinese language is highly metaphorical and rich in linguistic contexts for temporal presentations. The findings from this can help explain why the Chinese language consists of both horizontal and vertical temporal systems and why it has a higher frequency usage of spatialized metaphors for time than does English. Data from my study showed that the nature of the cross-linguistic differences between Chinese and English influenced the speakers’ construction of time differently. This characteristic also reflected on the narratives. Via qualitative analysis of current data, the results revealed that Chinese and English speakers
used different discourse patterns in narrating the story. When they speak the target language, they applied their L1 discourse pattern to the L2 storytelling.

As discussed, Chinese speakers’ speech and thoughts are metaphorical, consisting of various details in describing one factor or event. On the other hand, English speakers’ thinking and speaking are linear and concise. Unlike English narrative patterns, Chinese narratives characterize abstract, multiple perspectives, and are indirect. Chinese speakers’ and English speakers’ different thinking patterns are influenced by their different characteristics of linguistic contexts, including Chinese as a highly metaphorical language and English consisting of explicit tense and aspect markers. Taken together, these findings and rationale emphasize the notion that Chinese speakers are conditioned to be more multi-task oriented, at least during the process of constructing stories. When Chinese speakers perceive an image, they are more likely than English speakers to associate multiple entities to relate among events. The results of the current study suggest that the nature of the Chinese language makes its speakers construct spatial metaphors at multiple dimensions.

The analysis of linguistic form and function of spatial and spatial-temporal usages between Chinese speakers and English speakers in the current study confirms the linguistic relativity hypothesis. Cross-linguistic contexts contribute to the formation of concepts in speakers from each speech community, and speakers from different speech communities pay attention to different aspects during storytelling. For instance, different metaphorical presentations and ways of employing tense structure between Chinese and English conditioned their speakers to speak and think in a certain way. Linguistic concepts vary from language to language, and cross-cultural conception differences can
be influenced by linguistic contexts in each language. The next section discusses further the development of spatialized conceptions in L2 from the perspective of second-language acquisition (SLA).

**The Formation of Spatialized Conceptions in SLA**

This section aims to respond to the second research question: To what extent does L1 influence the development of spatial-temporal conceptualizations in L2 across different proficiency levels? Based upon quantitative analyses between L2 learners’ speech in L1 and L2, this section discusses how cross-linguistic similarities and differences influence L2 learners’ formation of spatialized conceptions and spatialized metaphors for time in their target languages. This section also applies Vygotsky’s analysis of the relationship between L1 and L2 acquisitions to study the dynamic of conceptual development in L2. The investigations of concept development in L2 are two-fold: to compare L2 learners’ occurrence rates of each spatial referent category in L1 and L2 and to examine the formation of concepts and how L1 plays a role in L2 speech.

The results of comparing L1 and L2 use of space and spatial metaphors for time in English-speaking CLLs and Chinese-speaking ELLs demonstrate the complexity of L1 influences on L2 thinking and speaking. As Odlin (1989) states, similarities and differences between the target language and any other language that has been acquired previously can result in language transfer. Chinese and English languages consist of similar linguistic categories (i.e., temporal metaphors at a horizontal plane in both languages) and different linguistic categories (i.e., temporal metaphors at a vertical plane in the Chinese language only). By comparing the usages of physical locatives and spatial metaphors between L1 and L2 in CLLs and ELLs, the results from my study confirmed
Odlin’s (1989) statement and demonstrated that the similarities and differences between L1 and L2 result in various degrees of L1 influence in L2 speech, which are discussed further in the following sections.

**L1 influence on cross-linguistic universal categories.** Although Chinese and English use spatial terms at vertical and horizontal planes, the comparisons of L1 data from the current study suggest that English native speakers use significantly more locatives in both dimensions than do Chinese native speakers to describe physical space. While comparing L2 learners’ usages of locatives between their L1 and L2, English-speaking CLLs used significantly more horizontal and vertical locatives in English than in Chinese speech. The cross-linguistic difference in habitual language use of locatives between Chinese speakers and English speakers reflects their L2. Significant differences between L1 and L2 locative usage were found in English-speaking CLLs but not in Chinese-speaking ELLs. English-speaking CLLs used significantly more locatives in L1 than in L2. On the other hand, Chinese-speaking ELLs’ occurrence rates of horizontal locatives in L1 and L2 were similar, and although ELLs across proficiency levels used slightly more vertical locatives in L1, the differences generally were not significant.

It is not clear whether English-speaking CLLs’ less frequent use of locatives in Chinese was due to the formation of concepts in Chinese or simply because of their unfamiliarity of L2. Also, it is not clear whether Chinese-speaking ELLs’ less frequent use of locatives in English was due to the influence of L1 or to the unfamiliarity of the English language.

As Figure 13 shows, English-speaking CLLs, except at the beginner level, had a higher frequency of Chinese horizontal-spatial referents than did Chinese native speakers.
However, the occurrences of Chinese vertical spatial referents in English-speaking CLLs, except for native-like speakers, were less frequent than with Chinese native speakers. The horizontal-spatial category shows L1 influence on the CLLs’ L2 speech but not in the vertical-spatial category.

While there are similar linguistic features between L1 and L2, it is not easy to determine whether there is an L1 influence in their L2 speech by looking at the statistical significance. The narrative analysis as presented in Chapter 5 and in the previous section in this chapter can provide more information on how cross-linguistic and cross-conceptualized differences influence the speech of L2 learners.

**L1 influence on cross-linguistic diverse category.** The comparisons between English native speakers and Chinese native speakers’ L1 data suggest that Chinese native speakers use significantly more spatialized metaphors to reference time. Even though English lacks vertical metaphors for time, the speakers’ horizontal metaphors for time are significantly less than that of Chinese speakers when they speak their native languages. These differences have been carried to their L2 speech. Significant differences in frequency were found while using vertical metaphors for time in both CLLs and ELLs because of the lack of a vertical temporal system in the English language. Chinese-speaking ELLs also used significantly more horizontal metaphors to reference time than did English-speaking CLLs, which is because Chinese speakers are more metaphorical than English speakers, as discussed in the previous section.

The different frequencies of using vertical referents for time between L1 and L2 were significant in CLLs and ELLs. The frequency rates of using Chinese vertical temporal references in English-speaking CLLs were similar to that of Chinese native
speakers. According to this finding, cross-linguistic differences can have a positive influence on the acquisition of a second language. This might be because the significantly diverse features between two languages make L2 learners more aware of the differences.

The occurrences of vertical metaphors for time in Chinese narratives showed increasing rates along with the increasing proficiency levels of English-speaking CLLs and Chinese native speakers, as in Figure 17. This steadily increasing line was found only in the CLLs’ vertical conceptions for time, not in other universal spatial categories existing in both languages. This finding demonstrates that when L2 learners acquire a new concept in a new language, they went through developmental stages.

The findings from L2 speakers’ conceptualized spatial and spatial-temporal system data demonstrated the complex process of developing speaking and thinking in SLA. Because it is not easy to determine language influence in L2 speakers’ thoughts and speech, Vygotsky’s dialogical approach provides insights on studying this process of concept learning and development from a socio-cultural mediation perspective, which is discussed further in the following section.

**The development of thought and language in SLA.** Current findings on new conceptualization development in CLLs provide empirical implications to Vygotsky’s (1987) analysis of the relationships between L1 and L2 acquisition and the role of semiotic mediation in those processes.

Language is one of the semiotic means that can facilitate cultural internalization and the expansion of human culture, along with various systems of writing, schemes, mathematic symbols, signs, and graphics (Mahn, 1999; Vygotsky, 1987). The mediation process is a dynamic activity central to the internalization of the external physical world...
into internal psychological systems (Mahn, 2012; Vygotsky, 1987). Through practicing with semiotic means, such as with language, knowledge is internalized and supports the transformation of mental functioning. According to Vygotsky, qualitative changes in the development of the human mind occur during the use of semiotic means, and through regulatory of speech, concept and culture are formed and internalized (Vygotsky, 1987).

Vygotsky uses an analytical approach to study the complex relationships between thought and word and the transition from thought to speech, which occurs in the movement from inner speech to thought or in the movement from inner speech to external speech (Vygotsky, 1987). Language is a mediator for developing thinking, and language acquisition facilitates the use of speech to regulate activity and then to regulate thinking (Vygotsky, 1987). Verbal thinking is the unity of speaking and thinking processes, which constitutes the complexity of structure, meaning, sound, and thought. The dynamic process of verbal thinking mediated by internal (inner speech) and external language contributes to conceptual development.

Vygotsky uses *znachenie slova*—meaning created through language use—as an irreducible unit that maintains the essence of the whole, the unity of the thinking and speaking processes. He analyzes this unit to reveal the nature of the thinking/speaking system that is created through the internalization of social interaction (Mahn, 2012; Vygotsky, 1987). His analysis of *znachenie slova* is central to his analysis of how children develop their conceptual systems as they acquire language. His analysis of this unit reveals the relationship between the sociocultural meanings and the meanings that children construct in their thinking/speaking systems (Mahn, 2012; Vygotsky, 1987).
This analysis provides a framework for my examination of how time and space concepts in ELLs and CLLs influence their L2 acquisition.

As discussed in Chapter 4, the native language samples showed that English native speakers have more vertical referents for physical space than Chinese native speakers, while Chinese speakers have more vertical referents for time (as in Fig. 8). Since there is no vertical-temporal expression in the English language, the dynamic change of vertical-temporal expressions in CLLs of English speakers articulated the development of a new concept in L2. As in Fig. 16, the developmental curve of CLLs’ frequency usage of vertical-temporal referents across proficiency level went through incline (beginning level), decline (intermediate and advanced levels), and then incline (native-like) stages. Figure 17 also demonstrated a similar curve in ELLs across proficiency levels when they used vertical terms to reference physical space.

The overuse of vertical-temporal referents in beginning ELLs and the overuse of vertical-spatial referents can be related to the language generalization stage in Vygotsky’s verbal thinking. It is common when language learners start to acquire a new language, they tend to overgeneralize a newly formed concept. Once they develop the awareness of the word meaning, they are more conscious about their language usage. Therefore, we can see the regression of the language use in this newly formed concept. While they have mastered an L2, the formation of new concept is more established, and L2 learners are entering the internalization stage of verbal thinking process. Hence, native-like L2 speakers have frequency usage like native speakers.

In this case, the Chinese vertical metaphor for time is a newly developing concept for CLLs. Although spatialized metaphors for time and vertical locatives are not new
domains for English speakers, they are introduced as a new concept on the vertical timeline as they are exposed to Chinese. English-speaking CLLs develop their meaning from an earlier stage as lexical meaning, which is the meaning they understand, such as from a dictionary, and is based on their knowledge of their native language and their culture. Eventually, they move to the next level and understand the meaning that language uses in a social, cultural context. As Vygotsky (1987) states, language learners develop the internal meaning of a word depending on how they conceptualize “the world as a whole and the internal structure of personality (p. 276).” Cross-linguistic differences were brought to L2 learners’ attention during their language learning process. Through the negotiation of the function and meaning of a new linguistic element, L2 learners gradually internalize and generalize the new concept of vertical metaphors in expressing time in the Chinese language and culture.

**Conclusions, Implications, and Future Research**

I conducted quantitative and qualitative analysis to study the relation between linguistic form and function between Chinese and English. To apply the domain of space to metaphorical expressions of a timeline is universal across languages with variations that are culturally specific. Because a vertical conception of time is missing in the English language, it has been explored extensively by researchers who are studying how languages shape one’s thought (i.e., Boroditsky, 2001; Chen, Friederich, & Shu, 2013). The findings from this current study are consistent with linguistic relative theory, which claims our thought is shaped by our language. Native speakers of Chinese and English think and speak differently when they are speaking different languages and when they are speaking the same language.
By comparing cross-linguistic variations of using spatial and temporal referents between the Chinese language and the English language, the data revealed that people from different speech communities perceive the world differently. Results of the quantitative analyses provide preliminary indications of how Chinese speakers and English speakers talk about space and time differently. Without qualitative analyses of the narratives from Chinese speakers and English speakers, it is not likely that it can be determined why and how Chinese speakers and English speakers conceptualize space and time differently. By conducting a narrative analysis of Chinese speakers’ and English speakers’ storytelling in both their L1 and L2, the major finding of this study is that Chinese speakers and English speakers present different rhetorical styles.

Chinese influence on its speakers is to be more metaphorical and to perceive the world from multiple perspectives because the number of morphemes, such as verb conjugations, in the language is limited. Hence, Chinese speakers need to provide more information in the sentence, such as time and sequence of the events, while English speakers can express the same event by conjugating verbs. Chinese speakers’ habit of being resourceful while speaking has been influenced by their thinking process. Thus, Chinese rhetorical style is more abstract and seems to be out of focus, whereas English rhetoric is more linear. Therefore, it is not surprising that Chinese has more diverse metaphorical expressions of time, such as a timeline at a vertical dimension, than does English.

Second-language learners’ L1 habitual language use and worldview have been carried to their speaking and thinking in L2. Findings from this study are consistent with the linguistic relativity hypothesis and with Vygotsky’s sociocultural theory. Linguistic
relativity’s worldview and Vygotsky’s analysis of meaning-making provide not only theoretical frameworks for research methodologies but also for educational implications in SLA. Languages can influence one’s worldview, and learning a second language can expand one’s life experience and the awareness of diversity in the world. Findings from the current study provide the following recommendations for the field of language education and for additional research.

**Understanding learners’ linguistic and cultural background.** It is important for educators to have the awareness of learners’ linguistic and cultural background. The sensitivity of cross-linguistic and cross-cultural diversity is a critical quality for educators. Teachers can provide effective support to students and help them contextualize language structure, sociocultural values, and the like. For instance, instead of simply judging an ESL students’ writing to be unclear, if the instructor can utilize their knowledge on various rhetorical styles related to ESL learners, it becomes more constructive to provide students with explicit guidance on how to be an effective writer in the English language and culture.

Students also benefit more from being aware of the similarity and difference between their native language and target language communities. Teachers should provide opportunities to facilitate the discussions of linguistic and cultural diversity between languages. This is what contrastive or intercultural rhetoric (Connor, 1996, 2004) suggests: that language teaching should incorporate various genre and provide students with a broad range of contexts, so that students can learn a language through the contents. To discuss the expectations and norms of discourse and cultural communities can shape the situational expectations and practices of the target language. The comparisons and
contrasts can promote verbal thinking processes and further enhance the internalization and generalization of the target language. Through constant negotiation of word meanings and social functions, students are able to develop consciousness of the word meaning and its social function (Wertsch, 1991). Knowledge becomes internalized and supports the transformation of thinking and speaking by the discussions of language and culture.

**Application of various genres in language classroom and research.** One unexpected finding during data analysis suggests that different genres elicit various levels of speech and thought. For instance, because realistic fiction usually is a series of related life events, the speech elicited from realistic fiction is more likely to refine dialogue interaction of everyday events. On the other hand, fantasy requires additional time and tasks to contextualize uncommon events. In addition, speech elicited by fantasy tends to promote a higher level of thinking (Shine & Roser, 1999). Different types of text can facilitate various discursive contexts. For educational implications, it is important to select a wide range of texts for students. First, they can learn textual conventions used in various genres to establish a profound background knowledge. Second, the discussions of diverse genres offer systematic cognitive and language development in learners (Moschovaki & Meadows, 2005).

**Related narrative analysis.** During data analysis, the value of narrative analysis was significant. Data from the current study elicited rich information on speaking and thinking across language communities and across L2 proficiency levels. Narrative analyses provided in-depth understanding of the characteristics of L2 speech from various perspectives. One of the directions I will explore in the future is to further
investigate the formation of rhetorical styles in L2 through a narrative analysis approach and through a dialogical approach. Studying rhetorical styles helps to understand the internalization process of L2 learners. Applying dialogical analysis of L2 learners’ speech promotes the understanding of L2 learners’ development of sociocultural perspectives in teaching and learning.
References


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Appendix A Linguistic Style Guidelines

These are some notes that I made for this paper, which were based on Language Style Sheet (archived from http://www.linguisticsociety.org/files/style-sheet.pdf) and Bond’s (2013) Linguistic Style Guidelines (archived from http://www3.ntu.edu.sg/home/fcbond/data/ling-style.pdf)

- Punctuation

After the first occurrence of non-English forms, provide a gloss in single quotation marks: Latin *ovis* ‘sheep’ is a noun. No comma precedes the gloss and no comma follows, unless necessary for other reasons: Latin *ovis* ‘sheep’, *canis* ‘dog’, and *equus* ‘horse’ are nouns.

- NUMBERED EXAMPLES, RULES, AND FORMULAS

- Place each numbered item on a separate line with the number in parentheses; indent after the number; use lowercase letters to group sets of related items.

(2) a. Down the hill rolled the baby carriage.

b. Out of the house strolled my mother’s best friend.

- In the text, refer to numbered items as 2, 2a, 2a,b, 2a-c (with no parentheses).

- Examples in notes should be numbered as (i), (ii), (iii), etc., and should be referred to as such in the text.

- GLOSSES AND TRANSLATIONS OF EXAMPLES

Examples not in English must be translated or glossed as appropriate. Sometimes, both a translation and a word-for-word or morpheme-by-morpheme gloss are appropriate.
• Place the translation or gloss of an example sentence or phrase on a new line below the example, indented.

(26) La nouvelle constitution approuvéé, le président renforça ses pouvoirs.

‘The new constitution approved, the president consolidated his power.’

• Align word-for-word or morpheme-by-morpheme glosses of example phrases or sentences with the beginning of each original word; use tabs to make alignments rather than multiple spaces.

(17) Omdat duidelijk is dat hie ziek is.

because clear is that he ill is

• Observe the following conventions in morpheme-by-morpheme glosses:

i. Place a hyphen between morphs within words in the original, where relevant, and a corresponding hyphen in the gloss; do not use any hyphens in the gloss that do not have corresponding hyphens in the original.

ii. If one morph in the original corresponds to two or more elements in the gloss (cumulative exponence), separate the latter by a period, except for persons; there is no period at the end of a word.

(4) siastr-yn-y malunk-i

sister-POSS-M.PL.NOM picture-M.PL.NOM

‘the sister’s pictures’

iii. Gloss lexical roots in lowercase roman type.

Gloss persons as 1, 2, 3, and 4.

Gloss all other grammatical categories in small capitals.

iv. Abbreviate glosses for grammatical categories. List the abbreviations in a note.
## Appendix B Abbreviation Glosses

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1sg</td>
<td>First Person Singular</td>
</tr>
<tr>
<td>1pl</td>
<td>First Person Plural</td>
</tr>
<tr>
<td>3sg</td>
<td>Third Person Singular</td>
</tr>
<tr>
<td>3pl</td>
<td>Third Person Plural</td>
</tr>
<tr>
<td>CL</td>
<td>Classifier</td>
</tr>
<tr>
<td>ASP</td>
<td>Aspect</td>
</tr>
<tr>
<td>POSS</td>
<td>Possessive</td>
</tr>
<tr>
<td>PREP</td>
<td>Preposition</td>
</tr>
<tr>
<td>PROG</td>
<td>Progressive</td>
</tr>
</tbody>
</table>
Appendix C Consent Form

CONSENT FORM

CONSENT TO PARTICIPATE IN RESEARCH

INTRODUCTION

You are invited to participate in a research study conducted by Pei-ni Causarano PhD Student, from Educational Linguistics at the University of New Mexico. Results will contribute to my pilot project. You were identified as a possible volunteer in the study because you are either a Chinese language learner of English, English language learner of Chinese, or monolingual speaker of Chinese/English.

您受邀參與一個由新墨西哥大學語言教育所博士生林佩妮主導的研究。您的參與結果將有助於我的論文研究。您有可能符合參與本研究因爲您是母語為英文的中文學生，或是母語為中文的英文學生，或者是只說中文/英文的人。

PURPOSE OF THE STUDY

This proposed study will investigate the learning process of Chinese as a foreign language. The main purpose of this study is to understand the mediated process of Chinese foreign language learners’ (CHLs) acquisition of time and space concepts.

這個研究主要探討中文外語學習的歷程，研究目的在於了解中文學生對於時間和空間的用法及概念。

PROCEDURES AND ACTIVITIES

If you consent to participate, I will ask you to fill out a language questionnaire, which takes approximately 10 minutes to complete. If applicable, I will also ask you to provide relevant scored written samples and audio-taped oral interviews from the languages courses you are/were taking. Otherwise, I will have a short interview with you in your native language. In turn, you will tell two stories based on the picture books provided by the investigator first in your native language, and then in your target language. The storytelling will be audio-taped. Only one copy of each writing sample will be made and the original returned to you. The copy will be kept on file with the researcher.

如果您同意參與本研究，請您大概十分鐘填一份語言背景的問卷，如果可能的話，也請您提供您的寫作樣本和您母語口語的錄音，或者，研究者會用您的母語（英文）跟你簡單的對談。接著，您要根據研究者提供的兩本圖畫書把圖畫故事，您的語言樣本我只會複製一份，並將原稿還您。我們會將您的語言樣本安全的放在櫃子裏。

POTENTIAL RISKS AND DISCOMFORTS

The minimal risk as data is identified with an individual. The analysis of the language samples will not be used for any grading purposes. This study will in no way affect your grade. If you experience any discomfort, or have concerns about the procedure, you are encouraged to notify the investigators immediately, prior to proceeding.

Protocol #: 98-151

APPROVED: 10/26/09

The University of New Mexico Institutional Review Board
本研究對於個人的風險是極微的。研究的結果不會用作判斷評分標準，也不會影響到您的成績。如果您感到任何的不適或擔心研究程序，您隨時可以跟研究者表達您的意見。

**POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY - 潛在的利益**
Your participation in this study is completely voluntary. You will not have any direct benefits from participating in this study. The general benefit from the results of this study is to further understand how to develop a better teaching pedagogy for **Chinese foreign language learning**. The understanding of cross linguistic similarities and differences between concepts in two languages in second language acquisition benefits the larger community of **Chinese foreign language learners**.

您的參與是自願的，您並不會獲得直接利益。大體上，研究結果將有助於提高外語學習者及教學方面的研究。對於概念上語言的相似性和相異性的了解，有益於廣大的外語學習者。

**CONFIDENTIALITY - 保密性**
You will be assigned a participant number so your name will not be directly associated with any data collected in this study. Your name will only appear with the participant number on this consent form. All signed consent forms will be stored securely in a locked filing cabinet. The individual data will not be released to any other party for any reason. Your audio file will be erased after transcription.

每一個參與的人都會有一個代號，所以您的名字不會在研究中被提到。您的名字只會出現在本同意書中，而且所有的同意書都會被鎖在安全的資料櫃裡。您的個人資料絕對不會外洩。您的錄音在下載後馬上就會被銷毀。

**PARTICIPATION AND WITHDRAWAL - 參與及退出**
You can choose whether to participate in this study or not. If you volunteer to participate, you may withdraw at any time without penalty or loss of benefits to which you might otherwise be entitled. You may also refuse to answer any questions, release part of the writing sample or oral interview you do not want, and still remain in the study.

您可以選擇要不要參與研究。如果您自願參加的話，您在任何時候都可以退出，您的退出並不會影響到您的權益。您也可以選擇性的回答，或提供部分資料但不參與本研究。

**IDENTIFICATION OF INVESTIGATORS AND REVIEW BOARD - 研究者和評審委員**
If you have any questions or concerns about the research, please feel free to contact: Pei-ni Causarano; pcaurusa@unm.edu; phone: (505)-262-6408 or Dr. Holbrook Mahn, Associate Professor, Language Literacy and Sociocultural Studies, The University of New Mexico, Noma Hall Room 212, phone (505)-277-3587; e-mail holbrook@unm.edu. If you have other concerns or complaints, contact the Institutional Review Board at the University of New Mexico, 1717 Roma NE, Room 205, Albuquerque, NM 87131, (505) 277-2257, or toll free at 1-866-844-9018.

若您對本研究有任何問題，請連絡Pei-ni Causarano; pcaurusa@unm.edu; 電話: (505)-262-6408，或Dr. Holbrook Mahn, 新墨西哥大學語言社會文化學系副教授, Noma Hall Room 212，電話: (505)-277-3587; e-mail holbrook@unm.edu。若您還有其他問題及抱怨，請連絡新墨西哥大學研究倫理委員會，505-272-1129。
<table>
<thead>
<tr>
<th>SIGNATURE OF RESEARCH PARTICIPANT</th>
<th>研究對象簽名</th>
</tr>
</thead>
<tbody>
<tr>
<td>I understand the procedures described above I have been provided a copy of this form.</td>
<td>本人明白上述程序，我也拿掉一份副本，我的問題已完滿解決，我也同意參與本研究。</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Participant</th>
<th>(please print)</th>
</tr>
</thead>
<tbody>
<tr>
<td>研究對象姓名</td>
<td>（請寫正確）</td>
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</table>

<table>
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<tr>
<th>Signature of Participant</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>研究對象簽名</td>
<td>日期</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIGNATURE OF INVESTIGATOR</th>
<th>研究者簽名</th>
</tr>
</thead>
<tbody>
<tr>
<td>In my judgment the participant is voluntarily and knowingly providing informed consent and possesses the legal capacity to give informed consent to participate in this research study</td>
<td></td>
</tr>
</tbody>
</table>

| Name of Investigator or Designee | |
|---------------------------------||
| 研究者姓名 | |

<table>
<thead>
<tr>
<th>Signature of Investigator or Designee</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>研究者簽名</td>
<td>日期</td>
</tr>
</tbody>
</table>
Appendix D Language Background Survey

Language Background 语言背景问卷:
You can response to the following questions in the language (English or Chinese) that you are most comfortable with. 您可以用您最熟悉的语言(中文或英文)回答以下问卷。

Demographic Information 基本资料:
1. Program of study 主修/副修(if applicable): ____________________
2. Ethnicity 種族: ________________ 3. Place of birth 出生地: __________
4. Please indicate the country or countries in which you have lived for at least 6 months in a row, and your approximate age when you lived there: 請列出您連續待過至少6個月的國家，並填入當時的大約年齡:

<table>
<thead>
<tr>
<th>Country 国家</th>
<th>From Age 從幾歲</th>
<th>To Age 到幾歲</th>
<th>Country 国家</th>
<th>From Age 從幾歲</th>
<th>To Age 到幾歲</th>
</tr>
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</tbody>
</table>

Note:
____________________________________________________________________________

5. Please indicate all languages that you speak, studied or had much contact with, and you’re your fluency on the scale from 1 (beginner) to 5 (native or near-native). 請列出所有您會、學過、或有接觸的語言，並做自我評比:

<table>
<thead>
<tr>
<th>Languages 語言</th>
<th>Fluency 程度</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st 母語 Oral 口語</td>
<td></td>
</tr>
<tr>
<td>Written 讀寫</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>Oral 口語</td>
</tr>
<tr>
<td>Written 讀寫</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>Oral 口語</td>
</tr>
<tr>
<td>Written 讀寫</td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>Oral 口語</td>
</tr>
<tr>
<td>Written 讀寫</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>Oral 口語</td>
</tr>
<tr>
<td>Written 讀寫</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Language Learning Background Questionnaires (Cont.) 語言學習背景問卷:

6. Have you ever STUDIED Chinese Mandarin? 您有學習過中文(國語/普通話)嗎?

   Yes 有/No 沒有 (please circle one 請圈選一個)

   If yes, where and how long have you studied it? 若有，你在哪兒學習的？學習多久？

   ________________________________
   ________________________________

   Then, why do you study Chinese Mandarin? 你為什麼要學中文(國語/普通話)？

   ________________________________
   ________________________________

7. Have you ever STUDIED English? 您有學習過英文嗎？

   Yes 有/No 沒有 (please circle one 請圈選一個)

   If yes, where and how long have you studied it? 若有，你在哪兒學習的？學習多久？

   ________________________________
   ________________________________

   Then, why do you study Chinese Mandarin? 您為什麼要學中文(國語/普通話)？

   ________________________________
   ________________________________

8. Do you think that you are familiar with Chinese culture? 你覺得你對中華文化了解嗎？

   Yes 是/No 否 (please circle one 請圈選一個)

   Please explain 請解釋:

   ________________________________
   ________________________________

9. Do you think that you are familiar with American culture? 你覺得你對美國文化了解嗎？

   Yes 是/No 否 (please circle one 請圈選一個)
Please explain 請解釋:

___________________________________________________________________________________

___________________________________________________________________________________

10. What are the most challenging things about studying Chinese?
對你來說，學習中文(國語/普通話)的過程中，最困難的是什麼？

___________________________________________________________________________________

11. What are the most challenging things about studying English? 對你來說，學習英文的過程中，最困難的是什麼？

___________________________________________________________________________________