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Prospectus: Crosslinguistic Influence[1] in Mental Representations of Time in English-Mandarin Bilinguals

Background & Context

For hundreds of years, academics of all cultures have recognized that speaking different languages may influence a person's perception of the world around them. An old Chinese proverb says, "To learn a language is to have one more window from which to look at the world." Still, one of the most famous - and somewhat comical - sayings regarding language is attributed to Emperor Charles V, "I speak Spanish to God, Italian to women, French to men and German to my horse." While there is no real logical reasoning behind any of these specific categorical usages of languages, some academics would say he might be on to something. Students of international studies, business, relations, etc. are almost always instructed by their mentors or required by their academic program to study one, if not two or three foreign languages. Why? Because the best way to truly understand and relate to another culture is by learning and communicating in that culture's native tongue.

Apart from the obvious reasons of ease of communication, is this possibly because being able to speak that culture's language makes a person more likely to think as people of that

[1] *Crosslinguistic influence* or *transfer* (CLI) – the influence of a person's knowledge of one language on that person's knowledge or use of another language (Jarvis & Pavlenko, 2008)

culture do? If you asked Dr. Benjamin Lee Whorf, he would respond with resounding affirmation. The father of *linguistic relativity*, Whorf writes:

> *…We all hold an illusion about talking, an illusion that talking is quite untrammeled and spontaneous and merely "expresses" whatever we wish to have it express…The phenomena of language are background phenomena, of which the talkers are unaware or, at the most, very dimly aware…These automatic, involuntary patterns of language are not the same for all men but are specific for each language and constitute the formalized side of the language, or its "grammar"…From this fact proceeds what I have called the "linguistic relativity principle," which means, in informal terms, that users of markedly different grammars are pointed by their grammars toward different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers but must arrive at somewhat different views of the world.* (Whorf & Carroll, 1998, p. 221)

Whorf, along with other great scholars such as Humboldt, Boas, and Sapir, believed that semantic structures of different languages might be a reason for differences in cognitive and social behaviors of people from different cultures and societies (Gumperz & Levinson, 1991). This idea sparked monumental intrigue from scholars of multiple fields of studies, while the general public even became interested. According to Gumperz & Levinson (1991), the excitement was cut short, when, in the 1960s, the cognitive sciences began to progress and advance, claiming that human cognition and its development was universal, backed by linguistic anthropological discoveries of semantic universals in color terms (Berlin & Kay, 1969), structure of ethnobotanical nomenclature (Berlin, 1972), and kinship terms (Murdock, 1959).

Following this initial foundational period in which important theoretical concepts and methods were created was a transformational period where new research and advancements in concepts and methodology prompted new studies (Lucy, 2016). The main challenge was how to meet anthropological *and* psychological requirements for research: anthropology demands that languages be compared in terms of a neutral typological framework that respects the structural organization of each language, while psychology requires that language patterns produce referential entailments linked to nonlinguistic cognitive assessments of individual speakers (Lucy, 2016). The first fully-developed structure-centered approach to linguistic relativity was in Lucy (1992a, 1992b), in which the study contrasted English and Yucatec Maya number marking within a crosslinguistic typological framework (Lucy, 2016). This kind of approach, however, is rather difficult to implement and language comparison requires thorough structural analysis and comparative typological framing, but the results may not produce referential entailments suitable for developing a cognitive assessment (Lucy, 2016). The second approach caters psychological study requirements and is a domain-centered approach to linguistic description and typological comparison that chooses a domain of experience, such as color, time, or space, and explores how various languages categorize and conceptualize these (Lucy, 2016). The first fully-developed domain-centered approach was conducted by Levinson and colleagues, whose most well-known research dealt with the location of objects in space using different spatial frames of reference (Majid, Bowerman, Kita, Haun, & Levinson, 2004).

Fast-forward to today, linguistic relativity is now a well-recognized, albeit still somewhat controversial focus of psychological research, with most of these studies taking a domain-centered approach, which is exactly what Lai and Boroditsky (2013) choose to do in their study. In this study, they conduct two experiments, the first of which explores whether the three test

groups (English native speakers, Mandarin native speakers, and Mandarin-English bilinguals) are more or less likely to take an ego-moving perspective of time based on linguistic analyses. Results showed that English speakers were more likely to take an ego-moving perspective, which means that they would be more likely to visualize, "We are approaching the deadline," rather than, "The deadline is approaching" (Lai & Boroditsky, 2013). They also found that subjects displayed transfer effects of their first language (L1) on their second language (L2), but also L2 on L1, which was not entirely expected.

The second experiment, and the one on which I will be basing my study, tests the effects of metaphor use on mental representations of time. Mandarin speakers use both horizontal and vertical terms like *shàng* "up" and *xià* "down" to talk about temporal events (Lai & Boroditsky, 2013). Lai & Boroditsky (2013) display this example:

a. 上 一 个 礼拜
shang yi ge li-bai
up one classifier-ge week
"Last week"

b. 前 一 个 礼拜
qian yi ge li-bai
front one classifer-ge week
"Last week"

c. 下 一 个 礼拜
xia yi ge li-bai
down one classifier-ge week
"Next week"

d. 后 一 个 礼拜
hou yi ge li-bai
back one classifier-ge week
"Next week"

Previous findings suggest that Mandarin speakers are more likely than English speakers to discuss time using vertical metaphors, but attributing crosslinguistic difference in spatialization to metaphor differences is complicated because several aspects have been shown to influence and shape people's temporal reasoning, e.g. linguistic, cultural and personal experiences (Fuhrman, et al., 2011). To overcome this difficulty, an approach would be to manipulate the metaphors in a language to examine whether metaphors can "in-the-moment" influence how people spatialize time – and since Mandarin Chinese uses both front-back and up-down metaphors regularly to talk about time, it is possible to do this (Lai & Boroditsky, 2013). Results showed that metaphors did, in fact, influence how participants arranged time. Mandarin speakers were twice as likely (40%) to arrange time vertically when prompted with up-down metaphors than when prompted with front-back metaphors (19%), and vice versa (Lai & Boroditsky, 2013). Furhman et al. (2011) compared English and Mandarin speakers using the same experimental task, but instead used non-spatial language (e.g. yesterday, today, tomorrow) as prompts instead of spatial metaphors, resulting in English speakers arranging time on the left-right axis (93.5%) while Mandarin speakers were equally likely to arrange time on the left-right axis (46.8%) and the up-down axis (43.6%) (Lai & Boroditsky, 2013). This signifies that, without spatial metaphors as directional primers to in-the-moment influence mental representations of time, English speakers – due to language, culture, or other fundamental factors – will visualize time on a left-to-right horizontal axis, while Mandarin Chinese speakers are inherently not as limited in their conceptualization of space-time.

Research Question and Hypothesis

I plan to model my study off of Lai & Boroditsky (2013) and Furhman, et al. (2011), but will concentrate on the following question: How do the spatio-temporal metaphors in Mandarin Chinese influence immediate and habitual mental representations of time in English-Mandarin bilinguals? Instead of focusing on the differences in mental representations of time amongst English and Chinese natives, since previous studies have already displayed plenty of evidence proving this, I will focus on the *reverse transfer* effects that learning a second language (Mandarin Chinese) has on an individual's (native English speakers) cognitive habits and mental representations of the space and time domains.

Due to the prevalence of up-down and front-back temporal metaphors in Mandarin Chinese, advanced learners of the language should show effects of crosslinguistic influence in their mental representations of time both from habitual use and direct context of the situation (i.e. if spatial metaphors are used). I hypothesize that when English-Mandarin bilinguals are tested in Mandarin and prompted with spatial metaphors, their representations of time will be more similar with native Mandarin speakers, in large part due to the lexicon of the language; however, when EM bilinguals are tested in Mandarin using non-spatial primers, I hypothesize they will still display crosslinguistic influence in their mental representations of time, albeit in a weaker fashion, simply because they are using and thinking in Mandarin.

Methodology

I will model my study off the experiments in Lai & Boroditsky (2013) and Furhman et al. (2011). Utilizing the three-dimensional pointing paradigm used in both of these studies, I will ask the participant to put their hand out approximately a foot in front of their chest with their palm facing up and fingers brought together into a cone; this will be the reference point for all

questions. To answer my questions (samples below), participants will point to locations in the space around the reference point with the opposite hand.

Sample Non-Spatial Language Question: Suppose this is today. Where do you think yesterday is? What about tomorrow?

假设	这	是	今天。	你	认为
suppose	*this*	*is*	*today*	*you*	*think*
昨天	在	哪里？	明天	在	哪里？
yesterday	*located*	*where*	*tomorrow*	*located*	*where*

Sample Up-Down Spatial Metaphor Question: Suppose this is this week. Where do you think last week is? What about next week?

假设	这	是	这(个)	星期。	你	认为
suppose	*this*	*is*	*this*	*week*	*you*	*think*
上(个)	星期	在	哪里？	下(个)	星期	
up	*week*	*located*	*where*	*down*	*week*	
在	哪里？					
located	*where*					

Sample Front-Back Spatial Metaphor Question: Suppose this is this week. Where do you think last week is? What about next week?

假设	这	是	这(个)	星期。	你	认为
suppose	*this*	*is*	*this*	*week*	*you*	*think*
一(个)	星期	前	在	哪里？	一(个)	星期
one	*week*	*front*	*located*	*where*	*one*	*week*
后	在	哪里？				
back	*located*	*where*				

Sample Distractor Question: Suppose this is a banana. Where do you think an orange is? What about an apple?

假设	这	是	香蕉。	你	认为
suppose	*this*	*is*	*banana*	*you*	*think*
橙子	在	哪里？	苹果	在	哪里？
orange	*located*	*where*	*apple*	*located*	*where*

There will be three groups of participants: English monolinguals, Mandarin Chinese native speakers, and English-speaking learners of Mandarin Chinese (English-Mandarin bilinguals). For English and Mandarin Chinese natives, my control groups, I will conduct the study in their native tongues. For English-Mandarin bilinguals, I will conduct the study in Mandarin Chinese to see how utilizing L2 influences their cognitive processing.

The non-spatial language questions will aim to test the long-term effects of studying and using Mandarin Chinese on the English-Mandarin bilinguals, i.e. how studying Mandarin influences cognitive habits in spatial representations of time. The up-down and front-back spatial metaphor question sets will, on the other hand, test immediate influences of language, specifically, space-time metaphors, on mental representations of time. Finally, the distractor questions will be dispersed throughout the experiment to ensure participants do not figure out the purpose of the questions or a pattern to the procedures.

Prior to beginning the experiment, all participants will fill out a consent form, fill out a background questionnaire (Appendix A), and English-Mandarin bilinguals will complete a short grammar quiz to ensure they can comprehend and react to the phrases, metaphors, etc. used in the experiment like native speakers.

Significance

Previous research and studies in this field have been centered around L1 transfer on L2. For instance, if I am a native English L1 speaker learning Korean L2, it is expected that my experience in and knowledge of the English L1 language would influence how I use Korean L2. There have been few studies that explore the opposite effect, i.e. L2 transfer on L1. Furthermore, what differentiates my study from the studies of Lai & Boroditsky (2013) and Fuhrman et al. (2011) is that I am solely focusing on the testing results of bilinguals, i.e. native English speakers who learn Mandarin Chinese. These previous studies focused on native speakers of the languages displaying varying mental representations of time and space based on linguistic dissimilarities. Moreover, the bilinguals tested in the two studies were predominantly, if not completely, Mandarin(L1)-English(L2) bilinguals. The study I am designing will give insight as to how learning Mandarin influences native English speakers' conceptions of time, therefore providing empirical evidence testing the Theory of Linguistic Relativity.

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Appendix A: Background Questionnaire

Q1 Please answer the following questions as truthfully and accurately as you can. Thank you in advance for your time! / 请诚实地并正确地回答接下来的问题。谢谢您的帮助!

Q2 Please choose your age group. / 请您选择年龄。
- ❍ Under 18 / 18 以下 (1)
- ❍ 18 - 24 (2)
- ❍ 25 - 34 (3)
- ❍ 35 - 44 (4)
- ❍ 45 - 54 (5)
- ❍ 55 - 64 (6)
- ❍ 65 - 74 (7)
- ❍ 75 - 84 (8)
- ❍ 85 or older / 85 以上 (9)

Q3 Please choose the gender with which you identify. / 请您选择性别。
- ❍ Male / 男 (1)
- ❍ Female / 女 (2)
- ❍ Other / 其他 (3)

Q4 Please choose your ethnicity. / 请您选择种族。
- ❍ Caucasian / 高加索人 (1)
- ❍ Black or African American / 非洲裔美国人 (2)
- ❍ Native American or Alaska Native / 美洲原住民 (3)
- ❍ Asian / 亚洲人 (4)
- ❍ Native Hawaiian or Pacific Islander / 夏威夷原住民或太平洋岛民 (5)
- ❍ Other/Mix / 其他 / 混血 (6)

Q5 Please choose the amount of formal education completed. / 请您选择学历。
- ❍ Less than high school / 高中以下 (1)
- ❍ High school graduate / 高中毕业者 (2)
- ❍ Some college / 正在念大学 (3)
- ❍ 2 year degree / 两年学位 (4)
- ❍ 4 year degree / 四年学位 (5)
- ❍ Professional degree / 专业学位 (6)
- ❍ Doctorate / 博士 (7)
- ❍ Other / 其他 (8)

Q6 What is your native language? / 您的母语是什么？

- ❍ English / 英语 (1)
- ❍ Mandarin Chinese / 中文 (2)
- ❍ Other / 其他 (3) _____

Answer If What is your native language? / 您的母语是什么？ Mandarin Chinese / 中文 Is Selected

Q7 Do you study English as a second language? / 英语是您的第二语言吗？

- ❍ Yes / 是 (1)
- ❍ No / 否 (2)

Answer If Do you study English as a second language? / 英语是您的第二语言吗？ Yes / 是 Is Selected

Q8 How long have you studied English? / 您学习英语学了多长时间？

- ❍ Less than 1 year / 1 年以下 (1)
- ❍ 1-3 years / 1-3 年 (2)
- ❍ 3-5 years / 3-5 年 (3)
- ❍ 5-7 years / 5-7 年 (4)
- ❍ More than 7 years / 7 年以上 (5)

Answer If Do you study English as a second language? / 英语是您的第二语言吗？ Yes / 是 Is Selected

Q9 What age did you begin learning English? / 您几岁开始学习英语？

- ❍ Before age 2 / 2 岁以下 (1)
- ❍ Between ages 2-7 / 2-7 岁 (2)
- ❍ Between ages 7-12 / 7-12 岁 (3)
- ❍ Between ages 12-18 / 12-18 岁 (4)
- ❍ After age 18 / 18 岁以上 (5)

Answer If What is your native language? / 您的母语是什么？ English / 英语 Is Selected

Q10 Do you study Mandarin Chinese as a foreign language? / 中文是您的第二语言吗？

- ❍ Yes (1)
- ❍ No (2)

Answer If Do you study Mandarin Chinese as a foreign language? / 中文是您的第二语言吗? Yes / 是 Is Selected

Q11 How long have you studied Mandarin Chinese?

- ❍ Less than 1 year (1)
- ❍ 1-3 years (2)
- ❍ 3-5 years (3)
- ❍ 5-7 years (4)
- ❍ More than 7 years (5)

Answer If Do you study Mandarin Chinese as a foreign language? / 中文是您的第二语言吗? Yes / 是 Is Selected

Q12 What age did you begin learning Mandarin?

- ❍ Before age 2 (1)
- ❍ Between ages 2-7 (2)
- ❍ Between ages 7-12 (3)
- ❍ Between ages 12-18 (4)
- ❍ After age 18 (5)

Answer If Do you study Mandarin Chinese as a foreign language? / 中文是您的第二语言吗? Yes / 是 Is Selected

Q13 Are you currently taking a Chinese language course?

- ❍ Yes (1)
- ❍ No (2)

Answer If Are you currently taking a Chinese language course? / 您现在上中文课？ Yes Is Selected

Q14 How many hours per week is your Chinese class?

- ❍ 1-2 (1)
- ❍ 3-4 (2)
- ❍ 5-6 (3)
- ❍ 7+ (4)

Answer If Are you currently taking a Chinese language course? / 您现在上中文课？ Yes Is Selected

Q15 Have you ever lived in a Chinese-speaking country?

- ❍ Yes (1)
- ❍ No (2)

Answer If Have you ever lived in a Chinese-speaking country? Yes Is Selected

Q16 How long did you stay in that country?

- Less than 2 months (1)
- 2-3 months (2)
- 4-6 months (3)
- 7-8 months (4)
- 9-12 months (5)
- More than 12 months (6)

Q17 If applicable, please list any other foreign languages you have studied and how long you have studied the language. E.g. Spanish - 3 years, Korean - 1 year. / 请您写下您学习过的其他语言和学习的时间。比如，西班牙语-3 年、韩语-1 年。