What can Chinese speakers' temporal gestures reveal about their conception of time?

Yan Gu (yan.gu@uvt.nl)

Lisette Mol (l.mol@uvt.nl)

Marieke Hoetjes (m.w.hoetjes@uvt.nl)

Marc Swerts (m.g.j.swerts@uvt.nl)

Tilburg centre for Cognition and Communication (TiCC), School of Humanities, Tilburg University,
PO Box 90153, 5000 LE Tilburg, the Netherlands

Abstract

There is debate on whether vertical spatial metaphors in Chinese cause speakers to think vertically about time. The present study assesses whether Chinese speakers indeed have a vertical conception of time, by studying their temporal gestures accompanying speech. Chinese speakers were asked to talk about wordlists, consisting of time conceptions and sequences in both Chinese and in English. The results showed that Chinese speakers had vertical temporal gestures in L1 Chinese and had fewer vertical gestures in L2 English. Implications for the current debate and models of gesture production are discussed.

Keywords: temporal gestures; thinking for speaking; time conceptions; language shapes thought

Introduction

Does language shape our thought and do people speaking different languages have different ways of thinking for speaking (Slobin, 1987)? A case in point is how speakers of different languages use space to think of time. For instance, Chinese has the lexicons "shàng" (above) and "xià" (below) to indicate time conceptions of early and late. That is, a literal Chinese translation of "last week" and "next week" would be "above week" and "below week", respectively. However, English does not use vertical spatial words for the same purpose. Therefore, English and Chinese speakers may have different conceptions of time. When using spatial metaphors to talk about time, English speakers typically think of time horizontally, whereas Chinese speakers more often construct the conceptions of time vertically (Boroditsky, 2001). Boroditsky ascribed these differences to the different languages. This argument was challenged by others who did not find support for the notion that Chinese and English speakers think differently about time (e.g. Chen, 2007; January & Kako, 2008). Chen and O'Seaghdha (in press) propose that a possible difference in thinking about time between speakers of Chinese and English is not due to the languages, but rather due to the different writing systems.

Boroditsky and her colleagues made attempts to support Boroditsky's (2001) argument by studying time conceptions with different methodological means, such as measuring reaction times, and comparing perceptual judgments in fulfilling linguistics and non-linguistic tasks (Boroditsky, Fuhrman & McCormick, 2011; Fuhrman et al., 2011; Miles et al., 2011). Somewhat surprisingly, in this area of research, speakers' temporal metaphoric *gestures* have been understudied, even though there is an intuitive linkage between time, space and gesture. First, as known to all, "Time is space." People universally use spatial metaphors to think of time (Casasanto & Boroditsky, 2008). For instance, "in the distant past" is used to indicate a long time ago. Secondly, it is generally assumed that gesture and language share the same cognitive origin (e.g. de Ruiter, 2000; Kita & Özyürek, 2003), that gesture is an inherent part of language, and can work as a sign to communicate thought (Langacker, 2008). Moreover, co-speech gesture is an important information modality, next to speech, and can "provide salient, additional information" about aspects of a speaker's conceptualizations (Chui, 2011; Müller, 2008). E.g., temporal gestures produced by English people are in horizontal or sagittal directions, which visualize their timelines in the mind (Casasanto & Jasmin, 2012). Therefore, studying temporal gestures can contribute to the debate on language shaping conceptions of time.

The current study examines Chinese speakers' gestures when talking about things related to time. We ask two questions: 1) What can temporal gestures reveal about Chinese speakers' time conceptions? 2) How do languages shape gestures and thought? We hypothesize that if Chinese speakers produce vertical gestures where English speakers do not, these vertical gestures may provide visible evidence for Chinese speakers' thinking of time. Secondly, Kita & Özyürek (2003) propose that gestures are shaped by two modes of thinking, namely linguistic encoding and spatio-motoric thinking, which are coordinated online during formulation. Therefore, if language shapes gesture, Chinese speakers are expected to produce vertical gestures when using expressions like "shàng / xià-zhōu", literally "above / below week" (last / next week). Similarly, Chinese speakers are expected to produce fewer vertical gestures in their L2 English, a language in which there are no terms with vertically spatialized metaphors of time. However, if Chinese speakers of English still exhibit a vertical temporal

gesture pattern even in English, their thought must be shaped by their habitual spatial thinking of time vertically, rather than by the online coordination of gesture and speech.

Methodology

Participants

Thirteen native speakers of Chinese participated in the first half of the experiment which was a word definition task in Chinese. They are students at Tilburg University in the Netherlands and were paid for their participation. The other half of the experiment was in English. So far, only four participants participated in both tasks. Their English proficiency was measured by a quick placement test.

Stimuli

Eleven Chinese and English wordlists were constructed, ranging from two to four words. There were four types of wordlists, namely consisting of: 1) vertical spatial words to indicate time conceptions, e.g. "shàng / xià-zhōu" (above / below week, i.e. last / next week); 2) other words indicating time that do not have explicit reference to vertical space, e.g. "zuó-tiān, jīn-tiān, míng-tiān" (yesterday, today, tomorrow); 3) words that can be associated with time conceptions, such as "ape-man, caveman, modern man", again without explicit lexical reference to vertical space; and 4) controls that have no association with time, e.g. "giraffe, rabbit, elephant".

Procedure

Participants were first tested in Chinese, and then tested in English after at least one week. They were provided with a (fake) instruction, which informed them that the purpose of the experiment was to test the memory of their addressees. They were asked to fulfil two tasks: 1) telling their addressee what words they had seen in each wordlist; 2) defining each word in the list as explicitly as possible, clarifying the relationship between the words, and explaining this to their addressee in a logical way. The instructions stated that their addressee would have a memory test afterwards, consisting of writing down the wordlists and recalling how the speaker had defined the words. Each wordlist was presented twice to the instruction giver, such that each word was presented in the centre of a large monitor. The addressee was a native speaker of Mandarin in the Chinese task and a European in the English task, being either a Dutch-English bilingual or an English native speaker. Addressees could ask questions, but were not allowed to gesture. The experiment was videotaped. A post experiment questionnaire revealed that participants did not know the study concerned gesture production. All the participants signed consent for the video recording.

Coding

So far, eight wordlists have been analyzed. All gestures were coded as either a temporal gesture (showing a certain timeline), or not. The directions of temporal gestures were coded as *vertical*, *horizontal*, or *sagittal*. Participants could use temporal gestures in multiple axes, which were separately coded for each direction. Data of one participant were excluded, as he produced no gestures during the task.

Results and Discussion
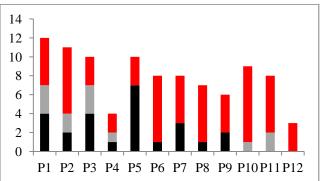
Gestures on Different Timelines in Chinese

Figure 1: Number of gestures in three directions in Chinese: along horizontal (red), sagittal (grey), and vertical (black) timelines, P = participant.

As shown in Figure 1, most participants gestured with more than one timeline. Nine out of twelve participants (75%) produced at least one vertical temporal gesture to indicate timelines or sequences in Chinese. This indicates that Chinese can think of time conceptions vertically. However, as Table 1 shows, the proportion of horizontal temporal gestures was much larger than that of vertical ones and of sagittal ones. This is consistent with the results from a corpus survey of Chinese spoken language, in which people use horizontal spatial metaphors more often than the vertical spatial metaphors (Chen, 2007).

Table 1: Temporal gestures on spatial metaphors in Chinese.

	No. of gestures	No. of total wordlists	%
Horizontal	59	12×8= 96	61.5
Vertical	25	12×8= 96	26.0
Sagittal	12	12×8= 96	12.5

Vertical Spatial Metaphors vs. Others

If vertical spatial words have an influence on speakers' gesturing about time, Chinese speakers most likely will produce vertical temporal gestures when using vertical spatial metaphors verbally. Therefore, the proportion of vertical gestures produced for each type of wordlist was further investigated. The four types were:

Vertical spatial metaphors: literally above week, below week (last week, next week); literally above life, below life

(previous life, next life).

Sagittal spatial metaphors: literally front year, behind year (the year before last year, the year after next year).

Non-spatial metaphors: yesterday, today, tomorrow; morning, noon, evening, late at night.

Things that can be associated with time sequences: e.g. ape-man, caveman, modern man; breakfast, lunch, dinner; appetizer, soup, main course, dessert.

Expressions using vertical spatial metaphors were produced with a much higher frequency of vertical temporal gestures than those using sagittal spatial, or non-spatial metaphors (Table 2). Things that can be associated with time were accompanied with vertical gestures the least, but 12.5% of them were still produced with vertical gestures. This indicates that vertical spatial metaphor seems to influence general gesturing about time.

Table 2: Number of vertical gestures on time conceptions produced in different types of wordlists. VSM = vertical spatial metaphor; SSM = sagittal spatial metaphor; NSM = non-spatial metaphor; TAS = time associated sequences.

	No. of gestures	Total No. of wordlists	%
VSM	11	12×2= 24	45.8
SSM	3	12×1= 12	25.0
NSM	3	12×2= 24	26.0
TAS	8	12×3-1= 35	12.5

First Language vs. Second Language

Chinese uses vertical spatial metaphors to indicate time, whereas English does not. Given that speech and gesture interact with each other (Kita & Özyürek, 2003), Chinese speakers are less likely to produce vertical temporal gestures when talking in English, even if they may have a Chinese way of thinking for speaking for English. Moreover, if they adopt the English way of thinking for speaking, they are likely to think horizontally of time, and therefore produce only horizontal gestures.

Temporal gestures of four participants who had fulfilled the L1 and L2 tasks were further analyzed. Table 3 presents their temporal gestures in three timelines in both languages. Notably, the percentage of horizontal temporal gestures increased in L2 English compared with the L1. Each participant produced horizontal temporal gestures when explaining any of the eight wordlists in English. By contrast, there was hardly any difference in the sagittal temporal gestures. Additionally, as it can be seen, P10 and P11 produced vertical gesture neither in the L1, nor in the L2.

Further analysis of vertical temporal gestures was made for P1 and P5. Interestingly, the number of vertical temporal gestures in the L2 dropped dramatically compared with the L1. Specifically, summing up data from P1 and P5, eleven out of sixteen wordlists were accompanied with vertical gestures in Chinese, whereas only four out of sixteen in English. Therefore, it seems that language influences

speakers' thinking of time.

Table 3: Number of gestures in the L1 Chinese (C) and the L2 English (E) (eight wordlists per participant), V = vertical, H = horizontal, S = sagittal, P = participant.

	CV	EV	%	CH	EH	%	CS	ES	%
P1	4	2	↓50	5	8	↑38	3	4	↑13
P5	7	2	↓63	3	8	↑63	0	0	-
P10	0	0	-	6	8	↑25	2	2	-
P11	0	0	-	8	8	-	1	1	-

General Discussion and Conclusions

The results showed that Chinese speakers produce vertical temporal gestures when talking about time conceptions. However, horizontal gestures were produced twice as often as vertical gestures. Therefore, the horizontal and vertical thinking of time conceptions are not mutually exclusive, that is, the differences between them are not categorical, but gradient. For example, when speakers were explaining the same wordlist, they not only gestured vertically but also horizontally. This means that it is possible for speakers to have two timelines in mind (Miles et al., 2011), or it could be that a gesture is not a direct correlate of a speaker's time conception.

What is interesting is which timeline is more activated at the moment of speaking. As Kita & Özyürek (2003) claim, iconic gestures are modulated by both linguistic thinking and spatio-motoric thinking (Kita & Özyürek, 2003). According to this prediction, in the present study Chinese speakers should be most likely to produce vertical gestures when these two modes of thinking are consistent. That is, when the linguistic encoding is represented with vertical spatial metaphors and when the spatial cognition is also vertical. That is the reason why the vertical spatial metaphor wordlists accounted for the highest proportion of vertical gestures (Table 2). Additionally, in the L2 English, there is no linguistic representation of *vertical* spatial words, so participants produced fewer vertical gestures. This can be explained by the assumption that there is an online coordination of speech and gesture, which supports Kita & Özyürek's (2003) Interface Hypothesis. Nevertheless, why were there still vertical gestures in the L2? These few vertical gestures that were produced in the English should be shaped by the spatial thinking, which was rooted in their L1. That is, the general cognition of being capable of thinking about time vertically. E.g., P1 lived in China 35 out of 38 years, which is much longer than the others did. Apart from the length of culture exposure, the effect may be related to the L2 proficiency levels. P5's proficiency level was "intermediate lower" whereas others' were "advanced".

More importantly, the fact that Chinese speakers were less likely to produce vertical temporal gestures and more often performed horizontal temporal gestures in their L2 as compared to their L1 can contribute to the current debate on

language shaping time conceptions. Given the fact that metaphoric gestures reflect speakers' thought, the findings provided evidence for Chinese vertical thinking about time.

Firstly, Chinese speakers do think differently about time conceptions than English speakers (horizontal and sagittal timelines for English speakers, Casasanto & Jasmin, 2012). Chinese speakers can construct time conceptions in a vertical way, which was represented in their metaphoric gestures. This vertical spatialized thinking not merely exerts a superficial influence on talking of time conceptions containing spatial words such as "above" and "below", but also has an influence on general cognition of their thinking of things that can be associated with time and sequential events. For instance, when talking about the wordlist of "ape-man, caveman, modern man", one participant said that "this is about human evolution. Human was developed from ape-man to caveman and then to modern man…" At the same time, the speaker produced vertical gestures to symbolize these three stages. She allocated a gesture on top of her head, went down to the height of the chest and further lowered to the level of knees.

Secondly, Chinese speakers' vertical thinking about time is not merely due to the traditional Chinese writing system. Some may claim that these vertical gestures are representations shaped by the Chinese culture which once wrote vertically, rather than a window onto speakers' time conceptions. It is conceivable that the vertical writing system can have some influence on Chinese speakers' thinking of time, but the participants were from mainland China, and reported that they had little experience in reading or writing vertically. Therefore, the influence of language seems more profound. For instance, the same Chinese speakers dropped the number of vertical temporal gestures dramatically when talking about the same wordlists in their L2 English compared with their L1 Chinese.

In an interview after the experiment, P1 and P5 were asked why they produced horizontal temporal gestures in English rather than vertical gestures as they did in Chinese. Their answer was because of the language. They thought that it is quite normal to have vertical gestures for "上周,下周" ("literally: above / below week"), whereas they were unlikely to associate them with a vertical timeline once it is presented as "last week" or "next week" in English. It was a bit uncomfortable for them to gesture vertically for "last week" and "next week". If this is true, language may shape speakers' thought and gesture.

This study showed preliminary results for a small number of participants, which only provided a first insight into Chinese speakers' thinking of time via temporal gestures. More data taking into account participants' L2 proficiency and length of culture exposure will be analyzed in further investigations. Future work will also survey English learners of Chinese and further compare the perceptual differences of temporal gestures by speakers from different languages and at different proficiency levels.

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