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Culture and Time Perception: Implications for Mental Representation and Decisions

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**UNIVERSITY OF
PLYMOUTH**

**CULTURE AND TIME PERCEPTION: IMPLICATIONS FOR
MENTAL REPRESENTATION AND DECISIONS**

By

Siew Hong Tan

A thesis submitted to University of Plymouth

In partial fulfilment for the degree of

Doctor of Philosophy

School of Psychology

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AUTHOR'S DECLARATION

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Doctoral College Quality Sub-Committee.

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ABSTRACT

Culture and Time Perception: Implications for Mental Representation and Decisions

Siew Hong Tan

This thesis examines cultural variations in time perception, as well as the possible influences on mental representation and decisions. Building on prior research on cultural differences in time-related perceptions, two main time perceptions were identified and focused on, namely temporal orientation and the use of time metaphor.

The temporal orientation line of investigation explores the implications of a stronger future versus past orientation among English and Mandarin-speakers respectively. Based on Construal Level Theory, temporal orientation is expected to be related to psychological distance, which in turn affects the mental representations individuals form. The findings supported a stronger future orientation among English-speakers which is also evident in their mental representations that vary as a function of temporal orientation. However, Mandarin-speakers exhibited neither a strong past nor future orientation. A study examining the possible influence of temporal orientation on value judgment revealed a complex association between culture and value judgment.

The time metaphor line of inquiry investigates the use of time metaphors among English and Mandarin-speakers and also the possible implications of such tendencies. Although previous psychological research implies a possible connection between the use of time metaphor and sense of personal control, this relationship is yet to be established. The findings showed supportive evidence of a frequent use of ego and time-moving metaphors among English and Mandarin-speakers respectively. However, studies examining the relationship between the use of time metaphor, perceived personal control, and decisions (optimism bias and risk-taking) revealed little supportive evidence of an association between them. The findings and a range of methodological and theoretical implications are discussed in the closing chapter.

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Chapter 1: Culture and Time Perception

1.1 The Cultural Perspective

In April 1943, a report was published in The American Journal of Psychology that examined cross-cultural differences and similarities between Caucasians (white Americans) and East Asians (Chinese and Japanese) on physiological reactions to an emotional stimulus. Participant's responses to an emotional stimulus were tested and observed by striking a large and heavy hammer within a few inches from their hand. The Caucasian participants exhibited greater hand movement response and experienced greater change of pulse rates whereas the Chinese and Japanese participants experienced greater change of electrical resistance and breathing rates. The researchers, Stratton and Henry (1943) summarised that the two groups of subjects *"differ clearly in their reactions to our emotional stimulus, differ frequently and in considerable amount. But oddly, they differed in no such way that the one race is found to be generally more reactive emotionally than the other."* This finding suggested the possibility that fundamental human processes might have a basis in the dimension of culture.

The integration of culture into the studies of psychology is a controversial one because many basic human processes have been argued to be universal in nature (e.g., the universality hypothesis about human emotions) and there are different competing perspectives in psychological inquiry (e.g., absolutism, universalism, relativism). These perspectives vary in the extent to which human psychological processes and functioning are considered to vary across different cultures. However, the recent emergence of a stream of psychological findings incorporating the aspect of culture have demonstrated that culture

plays an important role in shaping and sustaining one's cognition and behaviour (e.g., Choi, Nisbett, & Norenzayan, 1999; Cohen, 2009; Markus & Kitayama, 1991; Masuda & Nisbett, 2001; Morris & Peng, 1994; Nisbett, Peng, Choi, & Norenzayan, 2001; Triandis, 1996). By using a comparative approach, cross-cultural studies take individuals' cultural context into account such as their sociocultural (e.g., social norms or roles, education, language) and ecological context (e.g., subsistence strategy, climate, geographic feature) (Berry, Poortinga, Breugelmans, Chasiotis, & Sam, 2011), to investigate the extent to which our human psychological functions and processes are outcomes of these conditions.

1.1.1 Defining Culture

There are many ways to define culture and many attempts have been made. In 1952, a book published by Kroeber and Kluckhohn contained a comprehensive list of definitions of culture proposed over the years. In the conclusion section, they suggest a definition on the concept of culture formulated by most social scientists:

"Culture consists of patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiments in artefacts; the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values; culture systems may, on the one hand, be considered as products of action, on the other as conditioning elements of further action." (pg. 181)

Generally, members of the same cultural groups are said to share similar cultural schemas, which consist of elements such as attitudes, roles, beliefs, norms, practices, values, etc. likely to be passed down from one generation to another. The transmission of these shared cultural elements among members of a specific community is likely to occur among those who use a common language that live within the same geographical area at a particular time period (see Triandis, 1996). Research into culture and psychological

processes are generally conducted based on the assumption that individuals shared similar cultural schemas (Triandis, 1989), the conceptual structures of knowledge that provide guidance on understanding and interpretation of daily events and objects.

In studies of cross-cultural psychological research, one of the most common methods to identify and to contrast cultural groups is based on the member's geographical region of origin. For instance, a common comparison in recent cross-cultural research is between easterners and westerners (East Asians such as Japanese, Chinese, and Koreans vs. Euro-Canadians or North Americans) (Oyserman, Coon, & Kemmelmeier, 2002). Individuals from these two cultural backgrounds have been found to vary systematically in a wide variety of aspects such as cultural context (individualism vs. collectivism) (Hofstede, 1991), cognition (Nisbett et al., 2001), and self-construal (Markus & Kitayama, 1991) among others.

A prevalent theme in comparative research of psychology is the contrast between individualist and collectivist cultural contexts (e.g., Hofstede, 1991; Triandis, 1989). The use of individualism vs. collectivism as cultural frameworks is commonly viewed as a continuum with individualism at one end and collectivism on the other (Ho & Chiu, 1994). According to Hofstede (2010), *individualism pertains to societies in which the ties between individuals are loose: everyone is expected to look after him- or herself and his or her immediate family. Collectivism as its opposite pertains to societies in which people from birth onward are integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty.* (p. 92).

Generally, collectivism is more prevalent in Asian societies (e.g., Chinese, Japanese, and Koreans) in comparison to Western societies (e.g., North Americans, Euro-Canadians) (Markus & Kitayama, 1991; Triandis, 1989, 1996). The distinction of individualism-collectivism construct has been found to be associated with some basic psychological

aspects such as cognition (e.g., holistic/analytical thinking - Nisbett et al., 2001), self-construal (e.g., independence/interdependence - Markus & Kitayama, 1991), attribution style (e.g., Choi, et al., 1999; Morris & Peng, 1994), and perceived personal control (e.g., Sastry & Ross, 1998).

1.1.2 Culture and Cognition

In the literature, one main source of differences between individuals from East and West is their distinct cognitive styles (e.g., holistic vs. analytical – Nisbett et al., 2001; dialectical thinking - Peng & Nisbett, 1999). There is ample evidence indicating that there are systematic cross-cultural differences in our underlying cognitive processes (Ji, Peng, & Nisbett, 2000; Morris & Peng, 1994; Nisbett et al., 2001; Norenzayan & Nisbett, 2000; Peng & Nisbett, 1999). Westerners tend to have an analytical thinking style which is characterised by attending primarily to an object as though it is detached from the field in which it is embedded. They focus more on the attributes of the primary object and pay relatively less attention to the surrounding context. On the contrary, East Asians are predisposed to think holistically. Compared to Western individuals, East Asians focus relatively more on the context including the relationship between an object and the field and they also have tendency to describe and make predictions based on relational context (Masuda & Nisbett, 2001).

Holistic or relational thinking, with its origins in Buddhist, Taoist, and Confucian philosophy, is chronically accessible in the minds of individuals with East Asians cultural background and is fostered and sustained by cultural contexts (see Nisbett et al. 2001). Individuals from East Asian societies perceive objects and events in the world as interconnected and the real meaning lies only in relations to the whole. In contrast,

individuals with Western cultural background believe that it is possible to decontextualise propositions. Their analytical way of conceptualising reality can be traced back to ancient Greek philosophy. The world is viewed as a composition of discrete objects and they also have tendency to reason about it using categories and rules (Nisbett et al., 2001)

A variety of findings support these contentions. For example, Chiu (1972) examined East Asians and Americans' categorisation strategies by presenting them with sets of three pictures (e.g. cow, chicken, grass). It was found that Chinese children tend to categorise objects based on shared relationship (i.e. cow and grass) whereas American children were more likely to categorise objects based on similarity (e.g. cow and chicken). Abel and Hsu (1949) found that Chinese-American subjects gave more whole card response to Rorschach inkblots than did European Americans, who gave more response that referred only to a part of the inkblot.

Masuda and Nisbett (2001) provides further evidence to cultural differences in the use of attentional strategy. Participants from either America or Japan were presented with a scene which is full of salient focal fish and also a complicated background (e.g. plants, background fish, water animals, bubbles, etc.). They were then asked to report what they see in the scene. The results showed that Japanese participants reported more background information and attended more to the relational context than did American participants. When the background information was replaced by a novel background, the changing of backgrounds has relatively little impact on Americans' ability to recognise the focal objects whereas it affects Japanese participants' recognition accuracy. Masuda and Nisbett concluded that Japanese participants' attention to object and the field is holistic in nature and thus their memory is context-dependent. In this case, focal objects are remembered by binding them to their backgrounds.

The influence of analytical vs. holistic thinking style can also be seen in the way individuals incorporate information from social context (Masuda et al., 2008). Japanese and American participants were presented with a central cartoon figure that depicted a different emotion than those that surround it and participants were asked to judge the emotion of the central cartoon figure. The researchers found that Japanese participants' perception of the central figure's emotion was influenced by those of the surrounding cartoon figures' whereas the American participants' perception of the central figure's emotion was not affected by those surrounding it. By using eye-tracking, they found that Japanese participants spent longer looking at the figures in the background compared to American participants. This finding supported their argument that Japanese view emotions as inseparable from contextual information whereas Westerners see emotions as individual feelings that can be isolated from social context. This study confirmed Asian individuals' attention is largely holistic in nature and their sensitivity towards contextual cues can also be observed in the social domain.

The same principle can be applied to understand the findings of cross-cultural differences in the causal attribution style between East Asians and Western individuals as to whether it is the field or the object. (i.e., attribution bias - Ross, 1977). The repeated findings of East Asians to have greater tendency to attribute event causality to external factors (e.g., situational constraints - Miyamoto & Kitayama, 2002; Norenzayan, Choi, & Nisbett, 2002; group dispositions – Chiu, Morris, Hong, & Menon, 2000; Morris & Peng, 1994) to a greater extent than did Western individuals supports the notion of distinct information processing style between the two cultural groups. This is likely due to Asians' holistic thinking style which encourage them to pay greater attention to the field or context

of object or event hence contextual factors are given more weight when explaining the cause of event or behavior.

On the other hand, Western individuals' belief that it is possible to decontextualize propositions is evident from their relative greater attention to focal objects (Masuda & Nisbett, 2001). Following from this, it makes sense that if contextual factors are important in explaining causal effects, personal factors (e.g., one's own actions) should be perceived as having less control over an event. Concurrently, if one perceives oneself as the main cause of a behavior or event, one should perceive oneself to have greater control over the cause of the event. Cross-cultural research comparing perceived sense of control between East Asians and Western individuals confirmed this line of reasoning (Sastry & Ross, 1998; Weisz, Rothbaum, & Blackburn, 1984).

Culture and Self-construal

Another distinction between individuals from Eastern and Western cultures is the difference in their conceptualisation of self. One of the core defining features of individualistic cultures is the independent view of the self, where the self is viewed as an 'individual' who exists in its own right and independently from their in-groups (Hofstede, 1980; Hui, 1988; Triandis, 1989; 1996). Individuals from individualistic societies place greater emphasis on personal agency or sense of autonomy and prioritise personal fulfilment and freedom. One's own choice and goals are given greater importance over social aspects/elements.

On the contrary, members of collectivistic cultures hold an interdependent view of the self. The self is viewed as a part of a collective group and exists interdependently with in-groups (e.g., family, ethnic group, nation) (Hui, 1988; Triandis, 1989). Individuals from

collectivistic societies are more concerned with harmonious interpersonal relations hence social connectedness and norms are emphasized. Groups goals and values are given priority as social membership is an integral part of their sense of identity (Hofstede, 1980; Markus & Kitayama, 1991; Oyserman, et al., 2002). However, a culture is neither fully individualistic nor collectivistic but instead possesses more or less of such characteristics (Singelis, Triandis, Bhawuk, & Gelfand, 1995).

Culture and Perception of Control

Sense of perceived personal control was found to be emphasized and valued to a greater extent in Western societies in comparison to East Asian societies (Sastry & Ross, 1998; Weisz et al., 1984). This is consistent with the relatively more and relatively less emphasis on personal autonomy in Western and East Asian societies respectively (Triandis, 1995) and also appears to be congruent with the attributional styles (i.e., internal vs. external respectively) observed in these two cultures (Norenzayan et al., 2002).

The literature on locus of control suggest that individuals differ in the way they attribute the cause of event outcomes (e.g., Rotter, 1966). Specifically, individuals who have greater internal locus of control perceive event outcomes to be contingent upon one's own action, effort, skills, or ability. In contrast, individuals with greater external locus of control perceive event outcomes to be more likely due to external causes that are beyond one's control such as chance, luck, or powerful others (Levenson, 1981; Rotter, 1966).

The proposed construct of internal locus of control is consistent with the higher agentic orientation among individuals in individualistic cultures where one values sense of autonomy, the conception that actions or outcomes result from one's own choice instead of from sources or causes that are external to the person. Compared to collectivistic Asian

societies, sense of autonomy was given more attention in European philosophical thinking (e.g., Plato, Aristotle, and Kant) as autonomy is fundamental in defining an individual as a distinct person in modern European societies (Munro, 1985).

Unlike European societies, personal autonomy was given less attention in ancient Chinese societies both in defining what an individual is and also from ethical perspective (Munro, 1985). For example, *Jen* (i.e. 仁 means goodness or benevolence) which is one of the core values in Confucian teaching emphasizes the ability of a person to care and have concern for other people (e.g., family or people outside family) and is viewed as a fundamental basis of humanity. It is possible that in collectivistic societies where there are clear norms/rules and where social connectedness/harmony are prioritised, the self is perceived as relatively less autonomous (vs. individualistic societies) as one feels more obliged to attend to other people in order to preserve a harmonious social relationship. Therefore, external forces are inevitably given more weight and perceived as having greater influence on the course of event or event outcome. Thus, individuals in collectivistic societies have been found to have tendency to emphasize external locus of control to a greater extent than did individuals from individualistic cultures (Sastry & Ross, 1998).

Whilst the locus of control construct (Rotter, 1966) emphasizes a correspondence between action and outcome, also relevant is the two-process model of primary and secondary control (Rothbaum, Weisz, & Snyder, 1982). The process in which one *“attempts to change the world so that it fits the self’s needs”* is called “primary control” whereas the *“attempts to fit in with the world and to flow with the current”* is termed “secondary control” (Rothbaum et al., 1982, pg. 8). Many efforts to understand cultural variation on controllability has been conducted by referring to Rothbaum and colleagues’ two-process

model especially within the individualism vs. collectivism context (Triandis, 1995). It has been argued that members of Western individualistic societies (e.g., Americans) which emphasize personal agency¹, individual goals, and achievement should be more inclined to have greater primary control (one actively seeks to impose change or exert influence over the environment). In contrast, in collectivistic East Asian societies where harmonious social network and connectedness is highly valued, individuals should place greater value on secondary control (to accommodate or adjust to the environment) (Weisz, Rothbaum, & Blackburn, 1984a). Taken together, these suggestions and observations of cross-cultural variations in sense of perceived personal control support the view that controllability is a cultural product which varies according to cultural norms and values.

Another relevant observation in the domain of perceived personal control is the finding that perceived personal agency is reflected in the language that one uses (Fausey & Boroditsky, 2010; Fausey, Long, Inamori, & Boroditsky, 2010). For instance, whether one says, “he over-cooked the pie” or “the pie was over-cooked” implies different sources of agency and hence shape people’s construal of the event, in this case, pertaining to who should be held responsible for the event.

According to Fausey et al. (2010), the use of agentic (vs. non-agentic) linguistic structures was found to be more prevalent in the English language whereas the opposite was true for other languages (e.g., Japanese). In the Japanese language, there are different descriptions in place to differentiate between accidental and intentional actions. In comparison, in the English language, agentic linguistic structures are also used for accidental actions. The researchers subsequently found that the use of agentic (vs. non-agentic)

¹ Agency refers to the feeling that one can control external events by controlling one’s own actions (Haggard & Tsakiris, 2009). To the best of my knowledge, the constructs of “agency” and “sense of personal control” are not clearly differentiated in the existing literature. They may be overlapping and hence difficult to distinguish. Therefore, “agency” and “sense of personal control” are used interchangeably in the present thesis.

language was associated with better agent memory (i.e., who should be held responsible for an action). They argued that agentic language shifted people's attention accordingly thereby focusing them more on event's causal agent. Thus, their observation seems to suggest that culture, language and personal agency have an inseparable relationship.

1.2 Culture and Time Perception

Another aspect of cognition differs between Eastern and Western individuals is in their perception of time. The nature of time has been viewed differently in different cultural contexts (Castelli, 2015). One of the major distinctions in the cultural concept of time between East and West lies in the linear vs. cyclical notion of time. Western societies' time view is greatly influenced by the Judeo-Christian concept, philosophical (e.g., Plato, Aristotle, and Kant) and science development (e.g., Isaac Newton and Albert Einstein) (Castelli, 2015). Generally, time is perceived as linear and directional with individuals progressing along the linear timeline which stretches from the past to the future (Hall, 1983). In contrast, East Asian societies such as Chinese, Korean, and Japanese, have world views that are influenced and shaped by the teaching of Confucianism, Taoism, and Buddhism. Generally, East Asian societies hold a cyclical perspective of time which implies change and progress are cyclical, continual, or possibly repetitive in nature (Castelli, 2015).

Western society's linear sense of time is consistent with their belief of constancy in the world. Whilst time is perceived as an entity that can be separated into distinct segments (i.e., past, present, future) (Graham, 1981), the reality is perceived as consisting of fixed and identifiable entities and therefore objects and events can be understood by removing them from their context (Peng & Nisbett, 1999). This line of thinking is consistent with their analytical thinking style where objects can be attended independently from their field by

using rules or categories (Nisbett, et al., 2001). A related observation is a tendency to assign causality to internal dispositions including humans (Norenzayan, et al., 2002) and animals (Masuda & Nisbett, 2001).

On the other hand, East Asians' cyclical view of time is parallel with their belief that the world is in constant change or transformation. As the world is perceived as consisting of entities that interact constantly and endlessly, reality is always dynamic and subject to change. Elements of reality are interconnected and exist in a state of flux and are therefore attended to as a whole (Peng & Nisbett, 1999). This line of thinking is consistent with the holistic thinking style among East Asians where events or objects are attended by incorporating the contextual background (Nisbett et al., 2001). As a result, East Asians have tendency to assign causality to contextual or external factors (see review by Choi, et al., 1999).

Psychological studies have observed that the conception of self in relation to time (i.e., the use of time metaphor) (Lai & Boroditsky, 2013) and the temporal region individuals prioritise (i.e., future oriented vs. past oriented) (Ji, Guo, Zhang, & Messervey, 2009) are different between individuals with a Western and an Eastern cultural background. These time-related tendencies have been suggested to have implications on individual's cognition and judgments (Caruso, et al., 2008; Caruso, 2010; 2013; Guo, Ji, Spina, & Zhang, 2012; Ji et al., 2009).

1.2.1 Metaphorical Time Representation

We say that time *flies*, it *moves*, it *speeds up*. Time is *now*, is *past*, is *future*. It is slow, it is fast, it takes *forever*. Someone is *ahead* of their time, someone is *behind* the time. They were here *before* us or we arrived *after* them. The use of these metaphorical expressions

allows us to define reality and convey our feelings including making sense of change or order of succession in our daily lives. As Lakoff and Johnson (1980) pointed out, “*the essence of metaphor is understanding and experiencing one kind of thing in terms of another*” (pg. 125). Without awareness, the use of metaphor is extensive in the spoken and written languages in our everyday life.

Metaphorical language is a common part of normal conversation. Whether “things are looking *up*”, “we still have a *mountain to climb*”, or “we are finally going *downhill*”, these sayings give us an idea of how events are progressing. The use of more concrete concepts (i.e., ‘up’, ‘mountain’, ‘downhill’) enable us to illustrate progress of event which is abstract in nature in a more tangible way. In fact, most of our conceptual systems (e.g., everyday thoughts) are largely metaphorical in nature which allows us to understand abstract events and objects by relying on more concrete concepts. The use of these conceptual metaphors affects our conceptual system without awareness (Lakoff & Johnson, 1980) and possibly independent of the language we use (Lakoff & Johnson, 1999). For example, one of the main consequences of the use of conceptual metaphor is that it maps our knowledge about a topic on a representational structure. For instance, the mapping of spatial metaphor onto the dimension of time (Lai and Boroditsky, 2013), as illustrated in the metaphors above.

As a subjective entity, time is often understood by drawing an analogue from other more tangible and more concrete dimensions such as physical distance (i.e., spatial) (see Fraassen, 2013; Boroditsky & Ramscar, 2002). Indeed, our sense of time is deeply grounded in space as events are perceived as temporally and spatially related. For example, temporal relations are frequently used to refer to spatial order (e.g., the steam engine was invented before Victorian era). Our experience or sensibility which is grounded in the spatial

dimension can be expressed by implying that time is “in motion” from the present (e.g., we are *approaching* the end of the year).

Although time and space are two deeply interwoven concepts, they have an asymmetrical relationship. Psychological research observed that a spatial metaphor is often used to describe time (Boroditsky, 2000; Lakoff, 1993) but a time metaphor is less likely to be used to describe space (Casasanto & Boroditsky, 2008; Lleras, Reali, Alviar, & Bermudez, 2014). Time is frequently conceived as movement in space and the movement can be conceived in one of two distinct spatial-time metaphorical perspectives: ego-moving vs. time-moving (Boroditsky, 2000; Casasanto & Boroditsky, 2008; Margolies & Crawford, 2008).

In the use of ego-moving perspective, an individual is perceived as an active agent moving towards or away from the referent object or event along a stationary timeline (e.g., “*We are approaching the new year*”). In the time-moving metaphor, an individual is perceived as a stationary entity in which referent object or event moving towards or away from (e.g., “*The new year is approaching*”). Cross-cultural studies comparing English and Mandarin-speakers have found cross-cultural differences in the way individuals mentally represent time. Accordingly, English-speakers tend to adopt ego-moving metaphor whereas Mandarin-speakers tend to have dominant time-moving metaphors (Lai & Boroditsky, 2013).

In the literature, it has also been observed that although both English and Mandarin-speakers frequently use horizontal terms (e.g., front/back) to refer to time, Mandarin-speakers are more likely to use vertical conceptualisation of time to refer to the temporal order of time periods (e.g., day, week, month, year, century, etc.) and also to the succession order of event or happenings. For example, “上世纪” (*up century*) refers to last (i.e., the previous) century and “下世纪” (*down century*) refers to next (i.e., the following) century.

These vertical spatial terms are also used in English but not as commonly found in Mandarin (Boroditsky, 2001). A possible explanation for this could be due to the difference in orthography pattern between Mandarin and English (Bergen & Lau, 2012). Whilst English text is arranged vertically from left to right, Chinese text is traditionally arranged in vertical columns from right to left². Due to the unavoidable involvement of the difference in native writing system between these two languages (Bergen & Lau, 2012), this aspect of time-related perception will not be the focus of the present thesis.

Ego-moving vs. Time-moving Metaphorical Representation of Time

The use of temporal languages in many cultures around the world confirm that time is often conceived as movement in space, whether *we look forward to the future or leaving the past behind*, the use of these spatio-temporal metaphors helps us communicate temporal expression. In English and Mandarin, the two most commonly spoken languages in the world, two dominant time metaphorical systems have been identified, namely ego-moving perspective and time-moving perspective (Boroditsky, 2000; Casasanto & Boroditsky, 2008; Gentner, Imai, & Boroditsky, 2002; Lai & Boroditsky, 2013; Margolies & Crawford, 2008).

In the psychology and linguistic literature, an individual's time perspective is obtained by asking the person a question that is seemingly ambiguous and can be interpreted subjectively, *'Next Wednesday's meeting has been moved forward two days. What day is the meeting now that it has been rescheduled?'* This question is widely used in research studies to assess individuals' time metaphors (McGlone & Harding, 1998). There

² The vertical arrangement in the People's Republic of China is now less common due to the official switch in 1956.

are two possible answers to this question and an individual's answer will tell us which time metaphor is adopted. If one takes a time-moving perspective, then forward is in the direction of motion of time, and the meeting should move from Wednesday to Monday. If one takes an ego-moving perspective, then forward is in the direction of motion of the observer, and the meeting should move from Wednesday to Friday.

Although individuals are able to represent time in both metaphorical systems³ (Boroditsky & Ramscar, 2002; Gentner et al., 1999; Lee & Ji, 2014), psychological research found that the use of ego-moving perspective is more prevalent among individuals with a Western cultural background whereas the use of time-moving perspective is more common among individuals with an Eastern cultural background (Lai & Boroditsky, 2013). In order to establish whether the difference in the use of time metaphor between English and Mandarin-speakers was driven by the difference in their conceptualisation of time or due to the different languages used in the testing materials, Lai and Boroditsky (2013) tested Mandarin-English (ME) bilinguals in English or Mandarin and compared their performance to that of English monolinguals or Mandarin monolinguals respectively. They observed that when ME bilinguals were presented with the English version of the time metaphor question⁴, they were still less likely to take ego-moving perspective compared to English monolinguals. When a different group of ME bilinguals were presented with the Mandarin version of the time metaphor question⁵, they were more likely to take ego-moving perspective compared to Mandarin monolinguals. The researchers interpreted the outcome as a supportive

³ The use of time metaphor is dynamic in nature as individuals are capable of alternating between the use of ego- and time-moving perspectives (Boroditsky & Ramscar, 2002). Therefore, it is important to note that whenever this thesis mentions “ego-moving” or “time-moving” perspective, it refers to “more ego-moving” or “more time-moving”.

⁴ *Next Wednesday’s meeting has been moved forward two days. What day is the meeting now that it has been rescheduled?*

⁵ *Suppose the clock says it is 1pm now. You need to move it one hour forward. What time will it be adjusted to?*

evidence of how acquisition of a second language affects bilinguals' understanding of spatio-temporal metaphors. Although the use of different groups of participants and different time metaphor questions makes it difficult to infer whether the difference was driven merely by general conceptual differences in participants' understanding of time, the results nevertheless suggest that the use of different languages in the formulation of the questions was unlikely to be the sole reason of the observed differences.

People's metaphorical representation of time can also be affected by their physical spatial movement or the thought of experiencing spatial movement (Boroditsky & Ramscar, 2002; Gentner et al., 1999). For instance, Boroditsky and Ramscar observed that when visitors at San Francisco International Airport were asked the ambiguous question about Wednesday's meeting, those who were waiting to depart and those who had just flown in were more likely to take ego-moving perspective of time compared to those who were waiting for someone to arrive. Similarly, by asking the same question, they found that passengers who were on the train connecting San Francisco and San Jose were more likely to take ego-moving perspective (vs. time-moving perspective) especially those who just got on the train and about to get off the train (vs. middle of journey). It appears that people's thinking about time is related to their bodily spatial movement or even the thought of experiencing spatial movement.

In order to examine the relationship between affect and agency in communication, McGlone and Pfiester (2009) examined the use of spatiotemporal words (e.g., pass/passed/passing, close/closer, begin/began/beginning) by searching their occurrence in a large corpus of spoken and text material (i.e., sample of languages). They found that positive events were more frequently encoded by human-agent temporal expressions whereas negative events were more likely encoded in event-agent temporal expressions. A

subsequent follow-up study conducted using a controlled laboratory setting confirmed the findings of their previous study showing that positive past experiences were more frequently described in human-agent manner whereas the use of event-agent agency was more frequent in negative experience narratives. They concluded that humans prefer to attribute positive event's agency to themselves but instead assigning negative event's agency to the event itself.

Another study by Lee and Ji (2014) demonstrated how individuals alternate between ego-moving and time-moving perspectives as a function of their feelings and the temporal location of the targeted event. Lee and Ji found that the use of an ego-moving metaphor was more prevalent among those who recalled negative past or positive future experiences whereas a time-moving perspective was more common among those who described positive past experiences or negative future experiences. Subsequent mediation analyses confirmed the mediating role of affect between recollection/anticipation of emotional event and the use of time perspective. This study outcome is consistent with the findings of McGlone and Pfiester (2009) where the use of time perspective is related to emotion of the event. It is also compatible with the suggestion that the use of ego-moving perspective is related to the self in motion and thus greater sense of agency compared to the use of time-moving perspective.

Another study by Ruscher (2011) which investigated the use of time metaphor and estimation of grief duration also lends supportive evidence to this notion. Participants were subjected to either ego or time-moving perspective prime prior to a time-estimation task. For the time-estimation task, they were asked to imagine the grieving process of a mother who has lost her young son then provide an estimate of the mother's grief intensity and duration. Although both groups of participants expected the loss to result in similar amount

of grief to the mother, participants who were primed with a time-moving perspective estimated the negative affect to last almost twice the estimation given by those that were primed with an ego-moving perspective. Ruscher argued that individuals who were primed with an ego-moving perspective adopted a more active approach by moving forward (e.g., carrying on with normal daily routine) in the grieving period and thus gave a shorter grieving period estimation. In contrast, those who were primed with a time-moving perspective depicted the mother waiting passively for the grieving period to pass and thus predicted a longer estimation.

Taken together, the above mentioned empirical findings put forward the idea of the use of ego-moving metaphor is associated with a self that is active and in motion in relation to time whereas the use of time-moving metaphor was associated with a stationary and a more passive self in relation to time.

Metaphor: More Than a Conceptual Representation

Metaphorical expressions are pervasive in daily life, not only to convey complex ideas but also to communicate abstract concepts (Lakoff & Johnson, 1980). The suggestion that the use of metaphorical expression might reflect cognitive processing has its root in the study of embodied cognition. The pervasive use of metaphorical expressions not only affect our cognition (Lai & Boroditsky, 2013; Thibodeau & Boroditsky, 2011) but also has profound influences on our perceptual experience (Bolt & Yum, 2010; Glicksohn & Ron-Avni, 1997; Lee & Ji, 2014).

As posited by Lakoff's Conceptual Metaphor Theory (CMT) (Lakoff & Johnson, 1999), our understanding of abstract and complex concepts which cannot be comprehended directly can be experienced in the bodily dimension. The study of embodied cognition is

grounded on such argument, our conceptual understanding can affect our bodily experience which in turn can also be affected by it (see review Reimann et al., 2012). For instance, the physical vertical dimensions of up vs. down are analogues of a variety of abstract concepts such as positive vs. negative (Meier & Robinson, 2004), control vs. lack of control (Schubert, 2005), and more vs. less (Joseph, Giesler, & Silvera, 1994) respectively. Furthermore, the use of metaphor has been found to have profound influences on the inferences we make concerning a concept or an issue in question.

In an attempt to investigate the influence of metaphorical expression on individuals' reasoning, Thibodeau and Boroditsky (2011) examined how an issue is metaphorically framed affects the solution people offer to solve the issue. They presented participants with different metaphor expressions to describe an issue in concern (i.e., crime) and had them to suggest solutions to the issue. They found that the metaphorical framing of crime seemed to invite different solutions being offered to solve the problem (e.g., "*crime is a virus*" corresponded to social reformation and "*crime is a beast*" corresponded to law enforcement). The researchers argued that the metaphorical framing of an issue invited different inferences being drawn about the issue in question hence different problem solving.

In studies of time metaphors, it has been found that metaphorical understanding of time can exert influence on the way we mentally represent time in spatial terms. Lai and Boroditsky (2013) investigated the influence of time metaphors on individuals' spatial representation of time. Participants were exposed to either front-back or up-down metaphors and asked to point to the space around them in which these time points were located. They found that when participants were prompted with up-down metaphors, they were more likely to lay out time along the vertical axis whereas when they were prompted

with front-back metaphor, they were more likely to lay out time in horizontal manner. The researchers argued that our habitual use of time perspective has immediate implications on the way we conceptualise and reason in temporal domains, in this case, the mapping of spatial metaphors onto the dimension of time.

Further downstream influences of metaphoric conceptions of time on perceptual experience come from studies related to time estimation. The use of distinct metaphorical systems of time (ego-moving and time-moving) appears to influence individuals' perceptions, judgments, and evaluations of time (Boltz & Yum, 2010; Glicksohn & Ron-Avni, 1997; Ruscher, 2011). For instance, people who adopt an ego-moving (vs. time-moving) perspective estimate that less time is needed to reach a goal (Boltz & Yum, 2010), perceive time to pass more quickly (Glicksohn & Ron-Avni, 1997), and expect emotional reactions to positive and negative events to be more short-lived (Ruscher, 2011).

For example, Boltz and Yum's (2010) found that the use of ego-moving perspective (vs. time-moving perspective) was associated with lower prospective and retrospective estimates of a task's duration. In other words, participants' use of ego-moving metaphors was associated with the perception that time will go past more quickly, and hence their goals will be achieved more quickly.

1.2.2 Temporal Orientation

Apart from the use of time metaphor, another aspect of time-related cognition observed to be different between Eastern and Western individuals is the temporal region those individuals emphasize. Although the linkages between the temporal regions (e.g., past, present, and future) are perceived to vary individually (Lasane & O'Donnell, 2005), a number of cognitive and affective studies (Caruso et al., 2008; Caruso, 2010; Caruso et al.,

2013; Guo et al., 2012; Ji et al., 2009; Van Boven & Ashworth, 2007; Van Boven et al., 2010) have demonstrated that individuals from different cultures appear to differ in their temporal orientation.

Temporal orientation⁶ refers to an individual's habitual tendency of cognitively attending to the past, present, or future (Holman & Silver, 1998; Park et al., 2017; c.f. time perspective: Zimbardo & Boyd, 1999) or the predisposition to have behavioural or affective responses that result from such a tendency (Lasane & O'Donnell, 2005). Previous cross-cultural psychological research contrasting East and West focuses mainly on individuals' temporal orientation toward past and future (Guo et al., 2012; Ji et al., 2009) therefore this thesis concentrates on the past and future dimensions.

Temporal Orientation and Psychological Distance

Many things or events that we bring to mind might not be related to the present, but instead to the future or the past. For instance, a movie I watched *last night*, a day out we had *last summer*; a car I am going to buy *when I save enough money*, a trip we are going to take *next month*. These events or objects at times might seem within reach or at times seem far away from us. This subjective feeling of closeness is coined psychological distance, with the 'self, here, and now' as a point of reference (Trope & Liberman, 2010).

In the literature, an individual's temporal orientation is established based on the underlying assumption of a perceived linkage between cognition and psychological distance.

⁶ According to Lasane & O'Donnell (2005), there is a subtle difference between the construct of temporal orientation and time perspective although some researchers view them as identical concepts. Whilst time perspective refers to the cognitive process of dealing with temporally relevant information, temporal orientation refers to the behavioural predisposition associated with the cognitive processes that deal with temporally relevant information. Compared to time perspective, temporal orientation is a more restricted construct as it involves a behavioural element. As the focus of the current thesis is on the implications of time perception on mental representation, judgment and decisions, therefore the present thesis does not make such differentiation.

As suggested by Ji et al. (2009), a temporal region that is thought of more often should be more accessible (come to mind more easily) and should hence be perceived as psychologically closer. For example, a past event that is thought of more often should more easily come to mind and thus feel subjectively closer.

The notion of psychological distance is a cornerstone of Construal Level Theory (CLT). CLT proposes that distal events - not being experienced directly by the self, here and now - can be construed at different levels. Increased psychological distance (e.g., temporal, social, spatial, hypotheticality) is associated with an increase in abstractness of construal. Specifically, events that are temporally closer in time tend to be represented at a low/concrete level that captures the peripheral, incidental, subordinate features of the event whereas events that are temporally distant are more likely to be represented at a high/abstract level that contains the central, general, superordinate features of the event (Liberman & Trope, 1998). For example, “getting healthy” might come to mind when planning a diet plan for next month whereas “counting calories” might crop up when planning a diet plan for tomorrow.

The literature of CLT points to a bi-directional association between psychological distance and construal, with empirical studies demonstrating that psychological distance may influence construal but also can be influenced by it (Liberman, Trope, McCrae, & Sherman, 2007; Semin & Smith, 1999). For instance, distant past memory (vs. recent past) was described with relatively more abstract descriptions. Conversely, more abstract retrieval cues (vs. concrete retrieval cues) triggered the recall of older memories (Semin & Smith, 1999).

The relationship between psychological distance and construal is likely due to a deficiency of information we have on remote entities compared to proximal ones (Liberman,

Trope, & Stephan, 2007). For instance, it is probable that we have less knowledge about places that are located spatially further away from us (vs. nearby) or we are likely to have less information about people socially more distant from us (vs. close friends). This lack of knowledge about an entity in question promotes a more abstract representation instead of a more concrete one.

A number of research studies suggest that the schematic representations we form about an entity direct our attention to their specific aspects and thereby affect our preferences, predictions, and judgments (see review Fujita, Trope, & Liberman, 2010). Accordingly, CLT has been extensively used as a conceptual framework to investigate possible downstream influence of psychological distance on domains including facial recognition (Wyer, Hollins, Pahl, & Roper, 2015), self-control (Fujita, Trope, Liberman, & Levin-Sagi, 2006), probability judgment (Wakslak & Trope, 2009), judgment and choice (Liberman & Trope, 1998), and ease of information processing (Tsai & Thomas, 2011), among others.

Psychological Distance and Mental Representation

Our ability to construct mental representations of future and past beyond the immediate present is contingent upon our ability to cognitively traverse into the future or look back on the past. This 'mental time travel' relies on cognitive processes involved in memory and imagination. Mental simulation is a detailed mental representation of one or a series of real or hypothetical events (Taylor & Schneider, 1989), for instance, hypothetical constructions or fantasies of potential future events or reconstructions of past experiences such as reminiscence of autobiographical memories.

Although previous research has demonstrated a connection between psychological distance and mental representation (e.g., Liberman & Trope, 1998), relatively little attention has been paid to the phenomenal characteristics of mental representations corresponding to the psychological distance individuals feel about the event/object in question. However, related works examining the connection between temporal distance of future or past entities (e.g., events/actions/people) and construal might shed some light on this.

Temporal distance is closely related to CLT, with the assertion that greater distance produces greater abstractness or more high-level construal (vs. proximal distance) (Liberman, Sagristano, & Trope, 2002; Liberman & Trope, 1998; Semin & Smith, 1999). Take Liberman and Trope's (1998) study for example, in which they compared participants' descriptions of distant future and near future activities. Participants were asked to imagine themselves performing various activities (e.g., moving into a new apartment, taking an exam) in either the distant future (i.e., next year) or the near future (i.e., tomorrow) and then describe these activities. Distant future activities were described with more high-level descriptions whereas near future activities were described with more low-level descriptions.

A similar outcome was found in Semin and Smith's study (1999) in which they investigated the association between construal of past events and temporal distance using a similar research paradigm to that of Liberman and Trope (1998). Memory of distant past events (vs. recent past events) tended to be described with more abstract narratives. Taken together, these findings demonstrate the influence of temporal distance on mental representation of both future and past events.

Notably only temporal distance was manipulated in these studies, and so perceived psychological distance of the event/action was never measured. Nonetheless the results suggest that psychologically closer events are more likely to be represented at low-level

construal whereas psychologically distal events are more likely to be represented at high-level construal. Accordingly, people's imagination or memory of temporally closer (D'Argembeau & Van der Linden, 2004) or psychologically closer events (Van Boven et al., 2010) were found to contain greater phenomenal characteristics included sensory details, contextual information, and emotionality (e.g., intensity).

Importantly, variability in mental representation is suggested to be one of the contributors of temporal value asymmetry (Van Boven, Kane, & McGraw, 2008), the observation that people attribute greater value to a future event than an identical event in the past. This has been observed especially among Western individuals (Caruso et al., 2008).

Mental Representation & Temporal Value Asymmetry

Imagine one day you want to skip a family gathering to attend a major sport event with your friends. Would it be better to seek permission from your family beforehand or seek forgiveness after? Psychological research seems to suggest you might be judged more harshly prior to the event taking place than after the event (Caruso, 2013) especially if you are from a Western cultural background.

Previous psychological research (Caruso et al., 2008) on the relationship between temporal asymmetry and judgement observed that people's judgment varied as a function of temporal region (past vs. future). The judgement that people make towards an event that will take place in the future does not necessarily equal the one they make in relation to an identical event that has taken place in the past. For example, we might be more willing to pay more for a product prior to acquiring it than after acquiring it or we might demand more money prior to carrying out a job than after carrying it out. This observation that people attribute greater value to a future event than an identical event in the past is termed

temporal value asymmetry (Caruso et al., 2008) and it has been observed in people's value and moral judgements especially among Western individuals (Caruso, 2010; Caruso et al., 2008; Caruso, et al., 2013).

In the literature, the temporal value asymmetry effect is exhibited by asking participants to assign value to an event or object that will take place at a certain amount of time from the present in the future and also towards an identical event or object that has taken place the same amount of time from the present in the past. A series of studies conducted by Caruso and colleagues demonstrated that Western individuals assign greater value to a future event or object than an identical one in the equidistant past (Caruso, 2010; Caruso et al., 2008; Caruso, et al., 2013). For instance, participants believed that they should be paid more money for completing a job and they also pick a more expensive wine for a friend to show appreciation when these scenarios were framed in a future condition (vs. past condition). These observations suggest that Western individuals assign greater value to future event compared to an identical event in the past.

A reverse temporal asymmetry effect was reported among East Asians (i.e., Chinese) (Guo et al., 2012). By using a similar research paradigm as that of Caruso et al. (2008), Guo et al.'s (2012) cross-cultural comparison study reported that Chinese participants assigned greater value to past events (vs. future). Guo et al. reasoned that Chinese participants have a disposition to focus on the past and therefore assign greater valuation to past related event/object (vs. future) whereas Canadians individuals are predisposed to attend to the future and therefore assigned greater valuation to future-related event/object (vs. past).

A subsequent experiment in Guo et al. (2012) confirmed this explanation. By asking participants to focus on a temporal region (i.e., to think about what they would do in the future or about what they had done in the past), those who were induced future-focused

assigned greater value to future event whereas those who were induced past-focused assigned greater value to past event. Guo et al. concluded that temporal focus accounted for their observation of cultural differences in temporal value asymmetry as Chinese participants exhibited temporal asymmetry effect as that of the Canadian participants when they were induced to focused primarily on the future and the same outcome was also observed among the Canadian participants.

The observation of asymmetrical value being attached to events in different temporal regions was found associated with the emotional response evoked by those events. Caruso (2010) observed that immoral behaviours tended to be judged as less fair when they were described as taking place in the future (vs. past). Participants also reported experiencing more intense negative emotional responses when the events were framed as occurring in the future. A series of mediation analyses revealed that emotion was a significant mediator between the temporal location of an event and judgements of its fairness. It was concluded that the inherent value that people attribute to future and past events might be underlined by emotional responses evoked by these events.

Caruso (2010) recruited only Western participants, therefore it is not clear whether the same outcome would be observed for East Asians. The findings are consistent with the observation that people exhibit more intense emotional responses when they imagine experiencing an event prospectively than retrospectively (Caruso et al., 2008; D'Argembeau & Linden, 2004; Van Boven & Ashworth, 2007). Possible explanations for this observation include inferences of intentionality and feelings of uncertainty. Thinking about negative outcomes that were framed as taking place in the future (vs. past) was found to be associated with greater judgments of intentionality and with more intense emotional responses (Burns, Caruso, & Bartels, 2012). In addition, compared to past events, future

events are less predictable and more ambiguous due to a lack of information or knowledge. The greater uncertainty of future events is likely to arouse greater emotional responses because they focus our attention and thus are more evocative than are past events (Wilson, Centerbar, Kermer, & Gilber, 2005).

Mental Representation & Culture

Mental simulation is powerful because it enables us to rehearse a potential future scenario or to recall a past event. Importantly, the ability to mentally simulate is the key that connects our consciousness of the past and the future. It helps us to conceive life events as different time points on a continuum (Suddendorf & Corballis, 2007). This ability is important for us to maintain a coherent sense of self by having a sense of continuity between the past and the future. For instance, an individual who lost the ability to recall any personal past events (i.e., episodic memory) was also incapable of imagining the future (see Rosenbaum et al., 2005). In other words, our ability to simulate possible future events is closely related to our episodic memory.

Although the sense of continuity of self is important in sustaining a healthy conceptual self, the question of what the self is seems to be culturally influenced. Cross-cultural research on autobiographical memory has demonstrated that the content of memories that people recall reflects the relative emphasis on sense of autonomy vs. social connectedness in Western vs. Eastern cultures respectively. For instance, Western individuals (e.g., Americans) tend to recall memories with the self as the focus of the event whereas Chinese tend to describe more social interactions in their memories (Wang & Conway, 2004).

In terms of future and past episodic thinking, Chen et al., (2015) compared the

number of events Chinese and Australian students imagine or recall in regard to some specific themes. When asked to imagine possible future events about achievement, Australian students managed to generate more events pertaining to this theme compared to Chinese students. On the other hand, when asked to recall events about relationship, Chinese students provided more events about interpersonal interactions (e.g., episodes with family and friends) than Australian students. These observations suggest that cultural norms or beliefs might impact content or reporting of imagination and memory.

As well as differences, Eastern and Western individuals' episodic thinking also shared some similarities. For instance, Shao, Yao, Ceci, and Wang (2010) examined the relationship between self-concept and prospective or retrospective episodic thinking. European American and Chinese individuals were asked to imagine and recall autobiographical episodes and then provide a description of themselves corresponding to those episodes. They found that participants' descriptions of their future self were more positive in nature compared to descriptions of their past self. Importantly, anticipation of future events tended to be more positive in valence compared to recollection of past events. This tendency is consistent with the positivity bias people typically display when thinking about their future (Weinstein, 1980).

Taken together, the above findings suggest that imagination and memory are self-serving processes that are sensitive to socio-cultural context. Imagination and memory are driven by motivation to sustain our goals and beliefs (Conway, Meares, & Standart, 2004; Conway & Pleydell-Pearce, 2000), in this case, to maintain a self that is consistent with personal goals or cultural values including an independent vs. interdependent sense of self (Markus & Kitayama, 1999) and a more future vs. past oriented frame of mind (Caruso et al., 2008; Ji et al., 2009) as discussed earlier in the present chapter.

1.3 Summary: Culture and Time Perception

To summarise, psychology and culture has a close and dynamic relationship. Culture and cultural differences have been widely researched and studied. Most cross-cultural psychological research is conducted based on the assumption that individuals shared similar cultural schemas, for example, the conception of how individuals are related to each other (i.e., individualism vs. collectivism) and how components are related to each other and also to the field (i.e., analytical vs. holistic thinking). Many aspects of these shared schemas have been found related to our psychological processes and functioning.

In the domain of time perception, previous research suggests that East Asians and Western individuals differ in two main aspects of time-related perception, namely temporal orientation and the use of time metaphor. For instance, Western individuals are relatively more future-oriented compared to East Asians who are relatively more past-oriented. The observation of temporal value asymmetry also suggests that the primary temporal region that individuals attend to may exert influence on other responses (e.g., mental representation, emotional response, and judgment). However, exactly how one's time-related perceptions and downstream implications such as individual's mental representation and decisions are related remained unclear.

On the other hand, there are also profound cultural differences in the use of metaphorical representation of time between Western individuals and East Asians. Although this might not imply the existence of downstream influences, it suggests a possible influence of higher cognitive inferences on further judgement and decisions. The present thesis intends to answer these questions and also investigate such possibilities.

There are several reasons to study culture, time perception, and its implications on mental representation and decisions. It enables us to gain insight into the cultural similarity

and differences on the concept of time, a basic but yet pervasive concept that is fundamentally important in its own right. Exploring time-related perception among East Asians and Western individuals also opens up the possibility of understanding other culturally-related mechanisms, for instance, behind one's mental representation, judgment, and decisions which is ever more important in the present increasingly globalized environment.

1.4 Overview of Present Research

The current research considers how culture and time perception can be brought together by exploring possible implications of distinct time-related tendencies for mental representation, judgment, and decisions. As the focus of the current research is on how culture and time perception affect mental representations and decisions, the contrast will be made between native English-speakers from Western individualistic societies and native Mandarin-speakers from East Asia collectivist societies. As discussed earlier, culture, language, and cognition have a complex and multifaceted relationship. Although it is difficult to untangle the effect of linguistic effects from other cultural influence, recruiting only native English and Mandarin-speakers from societies that shared similar cultural context will increase the possibility that an effect is due to similar cognitive orientation instead of linguistic effect.

Chapter 2 aims to replicate cultural differences findings in the two aspects of time perception identified earlier (the use of time metaphor and temporal orientation) between East Asians and Western individuals with a focus on Mandarin and English-speakers (Study 1).

Chapter 3 focuses on temporal orientation and its possible downstream cognitive influences including mental representation and valuation judgments. It first investigates how temporal orientation is related to the mental representation phenomenal characteristics of event in question (Study 2 & 3). Next, it examines how temporal orientation is related to mental representation as reflected by one's object value judgment (Study 4).

Chapter 4 has a focus on the use of time metaphor and its potential downstream influences. Although previous psychological research implied a possible connection between the use of time metaphor and sense of personal control, this relationship is yet to be established. The studies (Study 5, 6A, & 6B) presented in this chapter put this to the test. In addition, they extend the investigation to explore the association between metaphorical representation of time, sense of personal control, and decisions that individuals make.

Overall, the present thesis intends to contribute to our understanding of how culture and time perception are related. In addition, it also aims to further investigate whether cultural variability in time perception will have real life implications, such as on our mental representation, judgments, or decisions. Lastly, Chapter 5 discusses the findings, limitations, and also open questions in relation to these empirical studies and the related literature.

Chapter 2 - Cultural Differences in Time Perception

This chapter aimed to replicate the findings of two aspects of cultural differences (between East and West) in time perception as identified in Chapter 1, specifically, the use of time metaphor and temporal orientation. Previous research demonstrated that English-speakers were more likely to use ego-moving metaphors whereas Mandarin-speakers were more likely to use time-moving metaphors (Lai & Boroditsky, 2013). In addition, Western individuals have been found to be primarily future oriented (e.g., Caruso et al., 2013) whereas East Asians have been claimed to have a strong past orientation (e.g., Ji et al., 2009). The study reported in this chapter attempted to replicate the findings of such cultural differences by focusing on English and Mandarin-speakers. In addition, it also attempted to examine two novel hypotheses. First, I investigated the relationship between the use of time metaphors and one's sense of personal control. Second, I examined the relationship between the use of time metaphors and temporal orientation.

2.1 Culture and Temporal Orientation

Previous research into the extent to which people are cognitively biased towards a temporal region suggested the phenomenon of temporal asymmetry, the observation that people differentially attend to a temporal region (i.e., past, present, or future) (Park et al., 2016; Zimbardo & Boyd, 1999). One of the common measures of temporal orientation is psychological distance (Caruso et al., 2013; Ji et al., 2009). The proposed relationship between temporal orientation and psychological distance is based on the assumption that

individuals who attend more to a specific temporal region should place more emphasis on it, think about it more, and therefore feel subjectively closer to it (Ji et al., 2009).

As discussed in Chapter 1, prior research showed cross-cultural differences in temporal orientation, with Western individuals having been found to be primarily future oriented (Caruso, 2010; Caruso et al., 2008; Caruso et al., 2013; Guo et al., 2012; Ji et al., 2009; Van Boven & Ashworth, 2007) whereas East Asians are relatively more past-oriented (Guo et al., 2012; Ji et al., 2009). Compared to East Asians (e.g., Chinese), Western individuals (e.g., Euro-Canadians and Americans) have a strong future orientation and a weak past orientation. They place more emphasis on future and believe that future events can be shaped through implementing plans and actions (Kluckhohn & Strodtbeck, 1961). Their emphasis on progress and change as a means to improve quality of life, technology, and economic prosperity demonstrate their future-oriented approach mind-set (Nisbett, 1994). On the contrary, East Asian societies such as the Chinese and Koreans, who are influenced by the values of Confucianism tend to place great emphasis on strong traditional values and have a stronger past orientation (Kluckhohn & Strodtbeck, 1961; Ko & Gentry, 1991; Yau, 1988).

Various research studies have demonstrated temporal asymmetry in valuations, in which different value is assigned to different temporal regions. For Western individuals, future events and actions have been found to be attributed greater value compared to an identical event or action in the past. For example, Caruso et al (2008) reported that American participants believed that they should be paid more for a job that they expected to do one month in the future compared to an identical piece of work that they had done one month previously. American participants also reported a willingness to buy a more

expensive wine as a present for a friend when they imagined the friend would let them use his vacation home in the future, compared to when they imagined using it in the past.

Using the same research paradigm as that of Caruso et al. (2008, described above), Guo et al. (2012) found that Chinese participants believed they should be paid more for a job done in the past than an identical piece of work they are expected to do in the future. In addition, Chinese participants also planned to spend more money on a thank-you gift when they imagined their friend had let them use the vacation home in the past than when they imagined their friend would let them use it in the future.

Apart from the asymmetrical temporal valuations, East Asians also believe that the past is highly related to the present (Ji et al., 2009). Ji and her colleagues (2009) presented European Canadians and Chinese participants with a theft scenario and a list of clues relevant to the potential suspect's past and present behaviours. Participants were asked to judge the relevance of each of the items in solving the case. The authors found that Chinese participants considered past information to be more relevant in solving the case than did Canadian participants. In addition, East Asian individuals have been found to be more aware of the indirect and distal downstream consequences of events, and to assume that events will have broader indirect consequences (Maddux & Yuki, 2006).

In the literature, an individual's temporal orientation has been determined based on their perceived psychological distance towards a time point or event in the past versus future. For example, participants were asked to report their perceived closeness of a time point in the past or future (Caruso et al., 2013; Ji et al., 2009) or of a past or future event (Ji et al., 2009; Ross, Heine, Wilson, & Sugimori, 2005). For instance, Ji et al. (2009) asked Canadian and Chinese students to report their subjective distance of the same month one year ago. They found that Chinese participants (vs. Canadians) rated the same month one

year ago and the past exam as subjectively closer to them. A similar outcome was obtained when participants were asked to report their subjective distance of a past exam. On the other hand, a non cross-cultural study by Caruso et al. (2013) demonstrated that North American participants rated one month in the future as psychologically closer than one month in the past. Moreover, one year in the future was also rated as subjectively closer than one year in the past (Caruso et al., 2013).

Taken together, these studies show cross-cultural differences in individuals' tendency to be future- or past-oriented. Differences in perceived psychological distance may have further implications for mental representations. For example, there is a well-established link between psychological distance and level of construal – that is, the extent to which people interpret and represent information in relatively abstract vs. concrete terms (Liberman & Trope, 1998). As discussed in Chapter 1, CLT posits that an increase in psychological distance (e.g., temporal, social, spatial, hypotheticality) is associated with an increase in abstractness of construal (Liberman & Trope, 1998; Trope & Liberman, 2003). For instance, events perceived to be temporally more distant are more likely to be represented in more abstract terms (high-level construals) compared to events that are temporally closer (hence psychologically closer) (Liberman & Trope, 1998). Events that have occurred in the recent past or will occur in the near future tend to be described in a way that is rich in detail and contextual information, whereas events that are further removed in time are described in more abstract terms which capture only the central meaning of the event (Semin & Smith, 1999; Liberman & Trope, 1998). Consequently, if East Asians perceive past time points to be subjectively closer than do Westerners, they might be more likely to adopt low-level construals as well. Conversely, if Western individuals feel subjectively closer to future time point, they should be more likely to adopt high-level construals as well. As

part of the present study's investigation into cultural differences in time-perception, participant's temporal orientation will be examined and also their level of construal for past and future actions.

2.2 Culture and Time Metaphor

The second time-related perception of interest is metaphorical representation of time. As discussed in Chapter 1, in both English and Mandarin, there are two dominant ways of metaphorically representing time: ego-moving and time-moving (Boroditsky, 2000; Casasanto & Boroditsky, 2008; Gentner, et al., 2002; Lai & Boroditsky, 2013; Margolies & Crawford, 2008). The ego-moving metaphor describes an individual as an active agent that moves toward or away from a stationary referent object or event along a timeline whereas the time-moving metaphor describes an individual as stationary on the timeline, with the referent object or event moving toward or away from them (McGlone & Pfiester, 2009). Although individuals are able to represent time in both metaphorical systems, prior research has found that the ego-moving perspective is more prevalent among individuals with a Western cultural background whereas the time-moving perspective is more common among individuals with an Eastern cultural background (Lai & Boroditsky, 2013).

2.2.1 Time, Language, and Perceived Control

As indicated earlier, humans mentally represent time in dimensions that are grounded in physical experience such as spatial terms. The relationship between time and space can be easily observed in the phrases we use in everyday activities, whether we are *getting closer* to the new year or *moving away* from the past; the spring is *ahead* of us or we are leaving winter *behind*, we rely on the correspondence between time and space in order

to convey temporal expressions. The linguistic frameworks of ego and time-moving metaphors have been suggested to imply different source of agency about the event in question. In other words, they attribute the source of change to different entities (McGlone & Pfiester, 2009).

Consider these two sentences, *we are approaching the summer* and *the summer is approaching us*. Although these two forms of expressions both express similar temporal relationships between the observer and the event, they imply a different source of agency with the former implying *we* as the entity that causes the change by moving forward toward a standstill *summer*. In contrast, in the latter sentence, it was implied that *we* are the motionless entity whereas the *summer* is the source of agency that moves closer toward us. The agency assignments implied by ego- and time-moving metaphors are illustrated in Figure 2.1.

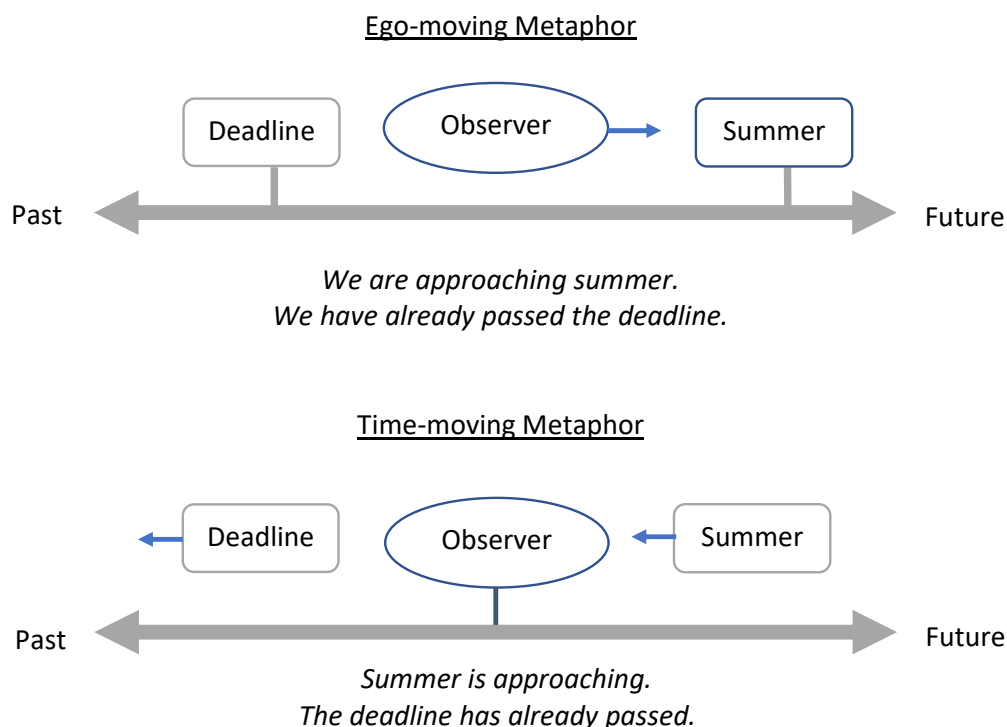


Figure 2.1 The temporal change conceptual framework of ego and time-moving metaphors (McGlone & Pfiester, 2009)

This interpretation of how agency is assigned using different time metaphors is consistent with the way Westerners and East Asians attribute event causality. For example, Western individuals are more likely to exhibit fundamental attribution bias (Choi, et al., 1999) by over assigning event causality to internal dispositions despite the presence of situational constraints. On the other hand, East Asian's holistic thinking style encourage them to explain event causality by drawing on a wider range of contextual factors and thus they are less prone to the fundamental attribution bias (Choi, et al., 1999; Morris & Peng, 1999).

As discussed earlier in Chapter 1, various studies (see Nisbett, 2003 for reviews) have documented cultural differences in information processing between East Asians and Western cultural groups, with Western individuals predisposed to think analytically, attending primarily to the attributes of the focal object but paying relatively little attention to its surrounding context. In contrast, holistic thinking is more prevalent among East Asian individuals. This mode of information processing is characterized by attending to the focal object and the surrounding context as a whole. As a result, East Asians attend more to the context including the relationship between an object and the field in which it is embedded in. They have tendency to describe and make predictions based on relational context and find it relatively difficult to disentangle an object from its background (Ji, Peng, & Nisbett, 2000; Masuda & Nisbett, 2001).

In an attempt to demonstrate cultural variation in causal attribution, Morris and Peng (1994) compared the way Chinese and Americans students explain the behaviours of computer generated animated fish scenes (e.g., a single fish moves toward a group of fish; and in another scene a single fish moves away from a group of fish). They found that Chinese students were more likely to attribute the cause of the fish's behaviour to external

forces (e.g., one fish follows another fish) whereas American students were more likely to attribute the fish's behaviour to internal forces (e.g., hungry and swim to look for food). In the same study, they also analysed and compared the attributional patterns of two newspaper reports (i.e., an English newspaper and a Chinese newspaper) on shooting murder incidents that occurred in the United States. They found that the English newspaper attributed the cause of the incident more to the personal disposition of the murderer (e.g., "very bad temper") whereas Chinese newspaper tended to emphasize situational factors as the cause of shooting (e.g., "gunman had recently been fired"). Taken together, these findings indicated that Americans tended to attribute causes of events to internal factors whilst Chinese individuals tended to assign event causality to external factors.

The observation of cultural differences in the attribution of event causality (Choi et al., 1999) is consistent with the interpretation of agency assignment from time metaphors' linguistic frameworks (McGlone & Pfiester, 2009). The findings of frequent use of time-moving metaphors (i.e., assign agency to the event itself) among Mandarin-speakers and ego-moving metaphors (i.e., assign agency to internal disposition such as the self) among English-speakers are parallel with the observation of attribution bias and the preferred type of personal control found in both cultural groups respectively.

2.2.2 Culture and Perceived Control

In 1966, Rotter introduced the concept of 'locus of control', based on his observation that people have different generalized expectancies. Whilst some people attribute event outcomes as the results of their own making (e.g., effort or skills) (i.e., internal locus of control), others think that event outcomes are largely due to external factors (e.g., luck, or chance) that are beyond their control (i.e., external locus of control) (Rotter, 1966). An

individual's locus of control can be assessed by using the "Internal-External (I-E) Locus of Control Scale". This scale consists of a series of questions that each made up of a pair of two statements represents an internal and an external response respectively. The number of type of internal (e.g., "People's misfortunes result from the mistakes they make") vs. external (e.g., "Many of the unhappy things in people's lives are partly due to bad luck") statements a respondent agrees with serves as an indication of the type of locus control the respondent has.

As highlighted earlier, the use of two spatio-temporal metaphors are suspected to be related to degree of perceived control or personal agency. Agency is the feeling that one can control external events by controlling one's own actions (Haggard and Tsakiris, 2009; cf internal locus of control, Rotter, 1990). Individuals who adopt an ego-moving metaphor perceive themselves to be actively in motion. This should result in higher sense of agency compared to those who feel that they are at a standstill. Individuals who endorse a time-moving metaphor, on the other hand, feel that they are stationary waiting for events to move past them. It is suspected that such individuals would profess a lower sense of agency.

The findings of cross-cultural differences in perceived personal control appear to lend supportive evidence to this suggestion. There are well-established cross-cultural studies demonstrating that Western individuals place greater emphasis on being able to take control compared to East Asians such as Chinese, Japanese, and Koreans (Iyengar & Lepper, 1999; Sastry & Ross, 1998; Weisz et al., 1984). In individualistic Western societies, individuals are generally perceived as independent and autonomous entities. Personal autonomy is highly valued as people are expected to exercise their influence through the use of their personal control or agentic action (see Markus & Kitayama, 1999). As a result,

one tends to have greater internal locus of control, believe that what happens is mainly the result of their own action, effort, or skills (Connor & Shimizu, 2002; Sastry & Ross, 1998).

In contrast, East Asian cultures are predominantly collectivist in nature (Triandis, 1989). Collectivist societies have clear norms indicating that individuals are expected to maintain harmonious relationships with others. Such expectations encourage cultural practices that emphasize social connectedness, roles, and obligations. Members of collectivist cultures tend to have an interdependent view of the self, perceive themselves to be fundamentally connected to others. Such dispositions might promote greater attention to other people, as one needs to accommodate to the needs, feelings, or thoughts of other people and also adjust to the surrounding context. This indirectly reduces the amount of control one perceives oneself to have (see Markus & Kitayama, 1999). Therefore, individuals in collectivist societies tend to have greater external locus of control, believe that events outcomes are largely due to factors beyond one's control such as luck, chance, or fate (Connor & Shimizu, 2002; Sastry & Ross, 1998).

In a study by Iyengar and Lepper (1999), a group of Anglo American and Asian American children (i.e. Japanese or Chinese) participated in an anagram-solving task in which the choice of anagram was either chosen by children themselves or their mother. Children's performance was measured by the total number of correctly solved anagrams. Anglo American children managed to correctly solve most anagrams in the personal choice condition and they also spent more time on task compared to those in the mother's choice condition. In contrast, Asian American children performed the best and spent more time in the mother's choice condition compared to the personal choice condition. The authors concluded that personal choice was related to greater intrinsic motivation among Anglo American children who tended to have independent selves. In contrast, Asian American

children who tended to have interdependent selves were more motivated when choices were made for them. This observation led to the conclusion that personal choice and sense of autonomy are emphasized differently in different cultures.

Related research supported the idea that sense of personal control plays a different role in individuals' psychological well-being culturally (e.g., Cheng, Cheung, Chio, & Chan, 2013; Connor & Shimizu, 2002; Sastry & Ross, 1998). For instance, despite external sense of control being linked to negative psychological symptoms (e.g., depression, anxiety, or psychological distress) among Western individuals, such associations appear to be weaker among East Asians (see Cheng et al., 2013 for meta-analysis). This may be an indication that the importance of perceived control to psychological well-being is varied systematically across different cultures.

Notes on Terminology and Claims

1. A note on participants. Due to the involvement of linguistic analysis in the use of time metaphors, all the analysis in this thesis included only native English-speakers who were born in majority English-speaking countries which are predominantly individualist cultures (e.g., U.K., U.S., Australia, and New Zealand) and native Mandarin-speakers who were born in East and Southeast Asian countries which are predominantly collectivist in nature (e.g., China, Malaysia, Singapore, and Taiwan). It is worth noting that the comparisons between Western and Eastern individuals/societies in this thesis are typically referring to North Americans (e.g., European Americans, Euro-Canadians) and East Asians (e.g., Chinese, Japanese, Koreans or whose ancestors come from East or South East Asian countries) respectively. Previous works suggest that age has a close relationship with time perspective which possibly influence other cognition and emotional processing (e.g., Socioemotional

selectivity theory; Carstensen, 2006; Nurmi, 1991), therefore this thesis recruited mainly young adults (age 18 to 25-year-old) as participants from each of the cultural group in order to make a meaningful cross-cultural comparison. Therefore, the discussions and findings presented in this thesis refer mainly to individuals in this age group.

2. A note on testing materials. All the native English-speakers were tested in English whereas all the native Mandarin-speakers were tested in Mandarin. The testing materials were first developed in English, translated into Mandarin then back-translated to ensure that the intended meaning was retained (Brislin, 1970).

3. A note on inclusion criteria. All of the studies reported here include participants recruited mainly from online pools. Therefore, there was a screening process where incomplete responses, responses from those other than native English or Mandarin-speakers, responses with a duplicate IP address, and responses from participants reporting an age of less than 18-year-old were excluded.

2.3 Study 1: Cultural Differences in Time Perception and Perceived Control

2.3.1 Introduction

As highlighted earlier, it is suspected that the use of time metaphor might be related to perceived personal control or sense of agency one has. The linguistic frameworks of two common time metaphors, namely ego- and time-moving metaphors, were found to imply different sources of agency to different entities. Moreover, the interpretation of the pattern of agency assignment based on the linguistic framework is consistent with the event causality attribution styles (Choi, et al., 1999; Morris & Peng, 1994) and the preferred locus of control (Cheng et al., 2013) observed among East Asians and Western individuals.

However, the relationship between the use of time-metaphor and sense of personal control is yet to be established. The present study would be the first to put this to test, to examine the relationship between the use of time metaphor and sense of personal control. Study 1 sought to both replicate the findings of cultural differences in the use of time metaphor and to explore the relationship between individuals' perceptions of control and their endorsement of time metaphors.

In the existing literature, there are numerous findings showing that East Asians are more likely to attribute event causation to situational factors (e.g., contextual influences) as opposed to Westerners who are more likely to assign event causation to internal factors (e.g., trait or internal disposition of a person) (Choi, et al., 1999; Miyamoto & Kitayama, 2002; Morris & Peng, 1994).

The tendency of Westerners and East Asians to assign event causality to different factors (internal and external respectively) is consistent with the greater internal and greater external control observation in cross-cultural studies (Cheng et al., 2013). In Western societies where personal autonomy and agentic action is being emphasised and

valued highly, individuals tend to have greater internal locus of control, believe that the occurrence of events are contingent upon one's own ability or actions (Rotter, 1966). In contrast, in East Asian societies (e.g., China, Japan, and Korea) where there are strict social norms and individuals are expected to maintain harmonious relationships with each other, people tend to have greater external locus of control, believe that event occurrence are contingent largely on reasons beyond one's control such as fate, chance, or luck (Sastry & Ross, 1998). The divergence sense of perceived control between the two cultures are consistent with the frequent use of ego- and time-moving perspective in the Western and Eastern cultures respectively.

In the time metaphor literature, McGlone and Harding's (1998) ambiguous question has been extensively used to determine participant's metaphorical representation of time. However, the question is only a single item measure. There is a possibility that the result might be due to a function of language such as linguistic structure rather than perspective that one has. Therefore, this study examined participant's use of time metaphors using McGlone & Harding's ambiguous question and other spatial and clock related ambiguous questions.

Apart from the use of time metaphor, Study 1 also aimed to replicate the observation of cultural differences in temporal orientation by comparing the perceived psychological distance of an equidistant time point in the past and future. Psychological distance is measured as the perceived psychological closeness between the self (i.e., here and now) and the event in a specific temporal region (Trope & Liberman, 2010). This study attempts to replicate the finding of cultural differences in temporal asymmetry by adapting previous measures (Ji et al., 2009). A large sample of English and Mandarin-speakers

reported their subjective feeling of closeness to 1 month in the past and 1 month in the future.

As discussed earlier in Chapter 1, psychological distance is closely related to mental representation (i.e., CLT), with the assertion that greater psychological distance to be associated with greater abstractness or more high-level construal (vs. proximal distance) (Liberman, et al., 2002). Therefore, perceived subjective closeness to a time point in the future or the past is expected to influence the mental representation participants form. Therefore, participants were also asked to complete a measure of construal level to inform us of their mental representations of past and future actions. Based on the observation of temporal value asymmetry (Caruso et al., 2013; Ji et al., 2009) and CLT (Liberman and Trope, 1998), I expect English-speakers who should feel subjectively closer (or more distant) to the future should form a more concrete (or abstract) mental representation of future actions and thus describe future actions by using more low-level construals (or high-level construals) (vs. past actions). Likewise, Mandarin-speakers who should feel subjectively closer (or more distant) to the past should form a more concrete (or abstract) mental representation of past actions and thus describe past actions by using more low-level construals (or high-level construals) (vs. future actions).

Furthermore, as highlighted by a previous study (Caruso et al., 2013), the way we mentally represent spatial movement of events in relation to time implies an element of asymmetry in the psychological distance of past and future events. This is because, as time passes, future events are conceived as getting closer to us and past events are moving away from us. This implies a reduced temporal distance between the self and future which should in turn result in reduce *psychological* distance between the self and future. In contrast, as time passes the temporal distance between the self and past events increases, and thus so

does the perceived *psychological* distance between the self and past. Following this line of reasoning, I expect there to be a relationship between the use of ego-moving metaphor and temporal orientation. Specifically, the use of ego-moving metaphor should be related to reduced psychological distance to the future and increased psychological distance from the past. Study 1 is the first to explore this possibility.

In summary, Study 1 aims to a) replicate previous findings of cultural differences between East and West (specifically English and Mandarin-speakers) in time-related perceptions (the use of time metaphors and temporal orientation), b) explore the relationship between the use of time metaphor and sense of personal control, and c) assess the relationship between the use of time metaphor and temporal orientation.

2.3.2 Method

Participants

Five hundred and three participants participated in this study on a voluntary basis either on-line ($N = 465$) or by completing a paper questionnaire ($N = 38$). Online participants were recruited by posting study links on various psychological and non-psychological research websites and social-networking platforms (see Appendix A – Part I for online recruitment sources). Participants who completed the paper version of the questionnaire were recruited by approaching them directly in the university campus.

Out of the 503 participants who participated in this study, 237 valid responses were included in the analysis after screening process following the inclusion criteria (exclusion rate = 52.88%). 112 Responses were excluded due to incomplete data, 45 due to non-native English or Mandarin-speakers, 92 were below 18 years-old, and 17 responses were due to a duplicate IP address. The valid sample included 135 English-speakers (86 females, 1 missing

data, age 18-68 years-old, $M_{age} = 27.41$, $SD = 10.59$) and 102 Mandarin-speakers (58 females, 1 missing data, age 19-60 years-old, $M_{age} = 28.52$, $SD = 7.09$). The majority of the English-speakers were born in the USA (75.9%) and the U.K. (17.3%). The rest of the participants were born in Canada (5.3%) and Australia (1.5%). For the Mandarin-speakers, 98% of them were born in Malaysia and the remaining 2% were born in China. 34 participants completed the paper version questionnaire⁷ (10 English-speakers and 24 Mandarin-speakers).

Materials

Participants completed the following series of measures in a fixed order:

Time Metaphors: Participants were presented with a series of six questions intended to measure their metaphorical representations of time and space. In addition to the meeting question developed by McGlone and Harding (1998; i.e., *'Next Wednesday's meeting has been moved forward two days. What day is the meeting now that it has been rescheduled?'*), participants were also asked a further five questions (Richmond, Wilson, & Zenkin, 2012). These included *'Suppose the clock says it is 1pm now. You need to move it one hour forward. What time will it be adjusted to?'* and *'A book will be re-edited so that 'page 10' will move forward 5 pages. What page will 'page 10' now appear on?'* Three further questions presented participants with a row of letters, numbers or figures, with an X appearing over one of them. On these items, participants were asked what number/letter/figure X would be over if it moved forward a certain number of spaces (see Appendix A - Part II for time metaphor questions).

⁷ A series of 2 Culture (English, Mandarin) x 2 Method (Online, Paper) ANOVAs were conducted, with ego-moving score, psychological distance to the past, psychological distance to the future, internal locus of control score, high-level construal to the past, and high-level construal to the future action as dependent variables. There was no significant Culture x Method interaction (largest $F(1, 229) = 2.25$, $p = .14$, $\eta^2_p = .01$), therefore data collection method will not be discussed any further.

The question about meeting reschedule and clock reset was randomized across all participants. Participants' responses were classified as ego-moving or time-moving, any other responses were treated as missing data. The proportion of ego-moving responses was calculated for each participant. This scale displayed good internal consistency (Cronbach's $\alpha = .87$)

Locus of Control: Participants completed Rotter's (1966) Internal-External locus of control scale, which consists of 19 items that require participants to choose which of two statements they endorse. Each pair consists of an internal-control statement (e.g., 'People's misfortunes result from the mistakes they make') and an external-control statement (e.g., 'Many of the unhappy things in people's lives are partly due to bad luck'). One point is given for each internal or external response to a statement. The proportion of internal-control statements chosen by each participant was calculated. This scale displayed good internal consistency (Cronbach's $\alpha = .84$). The order of the statements was randomized across all participants.

Temporal Orientation: Participants rated how far away they felt to a point one month in the future (i.e. '*Please think ahead to exactly one month from today. How far away does one month in the future feel to you?*'), and how far away they felt to a point one month in the past (i.e. '*Please think back to exactly one month ago today. How far away does one month ago in the past feel to you?*'). Ratings were made on a 7-point scale (1 = *extremely close in time*; 7 = *extremely distant in time*). The order of the temporal orientation questions was counterbalanced across all participants.

Construal: Participants completed a series of questions adopted from Fujita, et al., (2006) and the Behavioral Identification Form (BIF; Vallacher & Wegner, 1989). In this measure, participants were required to choose between two descriptions of an action which

was identified as occurring either one month in the past or one month in the future. Each choice was between a low-level, concrete description (focused on how one would perform the action) and a high-level, abstract description (focused on why one would perform the action). For example, given the action 'sweeping the floor,' participants would choose between 'moving the broom' (low-level) and 'being clean' (high-level). Each participant was presented with 31 actions (see Appendix A – Part III for construal questions). Half of the actions were in the past condition and the other half were in the future condition. The presentation of items was counterbalanced across all participants. All participants answered both past and future condition. Half of the participants answered the past condition then follow by the future condition. The order of condition was reversed for the other half participants. The order of descriptions and items was randomised across all participants. The proportion of high-level descriptions chosen for past and future actions was calculated for each participant. The scales displayed good internal consistency (Cronbach's $\alpha_{past} = .72$; $\alpha_{future} = .74$).

Procedure

The online study link was open for participation for approximately two months after which it was deactivated or removed from the websites. Participants who clicked on the study link were first directed to the page which contains a brief introduction of the study. They were then asked to give their informed consent for their participation. Participants were asked to provide some basic demographic information (e.g. sex, age, first language, country of birth, and country of residing at time of participation) prior to the start of the questionnaire. Upon completion of the study, participants were thanked and debriefed. Participants were randomly assigned to one of four versions of the questionnaires which

counterbalance the sequence of the psychological distance questions (i.e. past and future) and action identification questions.

2.3.2 Results

Post-hoc power analysis (Faul, et al., 2009) revealed that with a sample size of 237, effect size of 0.45, the power achieved to detect the difference in psychological distance was 0.99.

Cultural Differences in the Use of Time Metaphor

An independent-samples t-test indicated a significant difference between English and Mandarin-speakers, $t(235) = 16.30, p < .001, d = 2.11$ such that English-speakers ($n = 135$) selected significantly more ego-moving responses ($M = .72, SD = .27$) than did Mandarin-speakers ($n = 102$) ($M = .16, SD = .26$)⁸.

Compared to Mandarin-speakers, English-speakers were more likely to provide ego-moving responses in all the time metaphor ambiguous questions [the meeting question, $\chi^2(1, N = 231) = 92.58, p < 0.001$; the clock question, $\chi^2(1, N = 235) = 144.06, p < 0.001$; the block marked 'X' question, $\chi^2(1, N = 233) = 78.26, p < 0.001$; the 5 people question, $\chi^2(1, N = 236) = 38.22, p < 0.001$; the book question, $\chi^2(1, N = 218) = 64.21, p < 0.001$; and also the alphabet question¹, $\chi^2(1, N = 232) = 54.32, p < 0.001$ (see Figure 2.2)].

⁸ Additional analysis conducted using only responses on the ambiguous meeting and clock questions revealed similar findings, showing that English-speakers ($M = .80, SD = .30$) were still more likely to adopt ego-moving metaphor than Mandarin-speakers ($M = .10, SD = .22$), $t(235) = 20.03, p < .001, d = 2.66$.

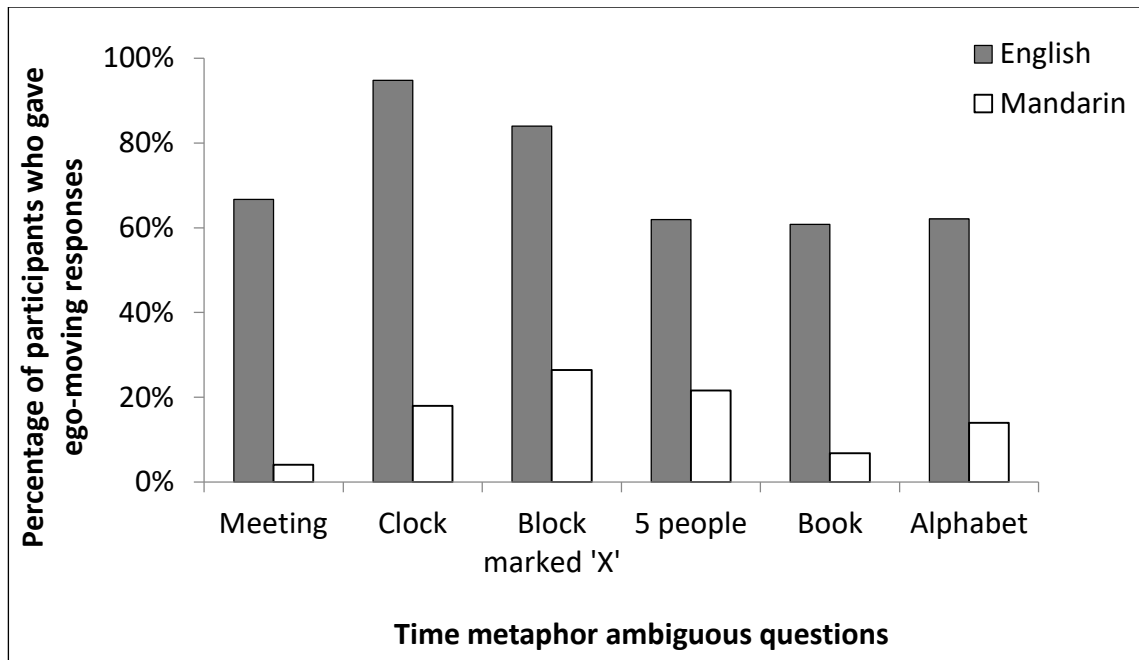


Figure 2.2 *Percentage of participants who gave ego-moving responses to the time metaphor ambiguous questions for Study 1.*

Relationship between Time Metaphor and Sense of Control

The proportion of Internal Locus of Control responses selected by participants was analysed using an independent-samples t-test. The results showed that English-speakers selected more internal (vs. external) responses ($M = .50$, $SD = .18$) than did Mandarin-speakers ($M = .46$, $SD = .18$), however, this difference was not significant, $t(235) = 1.60$, $p = .111$, $d = .21$. I had expected that metaphorical representations of time would predict locus of control, such that participants who more strongly endorsed ego-moving metaphors of time would also claim greater internal locus of control. However, that relationship was not present⁹ in either the overall sample [$r(237) = .01$, $p = .873$], or separately in the Mandarin [$r(102) = -.16$, $p = .10$] and English-speaking samples [$r(135) = -.05$, $p = .586$] (see Appendix A - Part IV for the ego-moving response and internal locus of control scatter plots).

⁹ Additional analysis carried out using only responses on the ambiguous meeting and clock questions revealed similar findings, showing that there was no relationship between the use of ego-moving metaphor and internal locus of control score in either the overall sample [$r(237) = .07$, $p = .272$], or separately in the Mandarin [$r(102) = -.08$, $p = .44$] and English-speaking samples [$r(135) = .01$, $p = .88$].

Cultural Differences in Psychological Distance

Participants' ratings of psychological distance to one month in the past vs. future were entered as repeated measures in a mixed-model ANOVA with culture (English vs. Mandarin) as a between-participants factor. There was a significant main effect of past vs. future ratings, $F(1, 231) = 25.82, p < .001, \eta^2_p = .10$, such that the past was rated as significantly more distant ($M = 4.15, SD = 1.82$) than the future ($M = 3.37, SD = 1.55$). There was also a marginal significant difference between cultures, $F(1, 231) = 3.87, p = .05, \eta^2_p = .02$, such that English-speakers rated both time points as more distant than did Mandarin-speakers (See Table 2.1). The culture X past/future interaction was not significant, $F(1, 231) = 0.70, p = .41, \eta^2_p = .003$. However, it is worth noting that overall English-speakers rated the past one month as more distant.

Table 2.1 Mean ratings of psychological distance as a function of temporal direction and culture in Study 1.

Culture	Past <i>M (SD)</i>	Future <i>M (SD)</i>
English ($n = 135$)	4.34 (1.82)	3.46 (1.59)
Mandarin ($n = 98$)	3.89 (1.80)	3.26 (1.50)

Note: Standard deviations are shown in parentheses. Psychological distance was rated using a scale ranging from 1 to 7. Higher scores indicate greater distance.

Relationship between Psychological Distance and Construal Level

The proportions of high-level construal responses selected to describe past vs. future actions were entered as repeated measures in a mixed-model ANOVA with culture as a between-participants factor. There was a significant main effect of culture [$F(1, 235) = 17.15, p < .001, \eta^2_p = .07$] such that Mandarin-speakers selected a greater proportion of high-level

construal responses than did English-speakers (see Table 2.2). This difference was not moderated by time (past vs. future), [$F(1, 235) = 0.14$, $p = .708$, $\eta^2_p = .001$] nor was there a significant main effect of time, [$F(1, 235) = 0.215$, $p = .644$, $\eta^2_p = .001$].

Table 2.2 *Mean proportions of high-level construal responses on construal measurement by temporal direction and culture in Study 1*

Culture	Past	Future
English ($n = 135$)	.59 (.23)	.57 (.24)
Mandarin ($n = 102$)	.68 (.21)	.68 (.19)

Note: Standard deviations are shown in parentheses. Higher scores indicate greater high-level construal.

As mentioned earlier, it was predicted that temporal orientation would predict construal level such that greater psychological distance from a particular point in time would correspond to higher-level construal for that time point. However, this relationship did not emerge for the overall sample, nor did it emerge when English and Mandarin-speakers were considered separately. See Table 2.3 for the correlation between high-level construal and psychological distance ratings.

Table 2.3 *Pearson's correlation between high-level construal and psychological distance ratings by temporal direction and culture in Study 1.*

Culture	Past	Future
Overall sample ($N = 233$)	.02	.02
English ($n = 135$)	.01	.12
Mandarin ($n = 98$)	.09	-.15

Relationship between the use of ego-moving metaphor and temporal orientation

As mentioned earlier, it was suspected that the use of time metaphor would be related to temporal orientation such that the use of ego-moving perspective would be associated with reduced psychological distance towards the future and increased psychological distance towards the past. This relationship did not emerge for the overall sample. When English and Mandarin-speakers were considered separately, the sole significant correlation was a positive relationship between the use of ego-moving perspective and rating of psychological distance to the future ($r = .19, p = .031$) within the English-speakers. See Table 2.4 for the correlation between ego-moving metaphor and psychological distance ratings.

Table 2.4 *Pearson's correlation between ego-moving metaphor and psychological distance ratings by temporal direction and culture in Study 1.*

Culture	Past	Future
Overall sample ($N = 233$)	.11	.11
English ($n = 135$)	.09	.19*
Mandarin ($n = 98$)	-.06	-.06

*Note: * $p < .05$*

2.3.3 Discussion of Study 1

Consistent with Lai & Boroditsky (2013), Study 1 found a strong tendency for English-speakers to adopt ego-moving metaphors compared to Mandarin-speakers who tend to adopt time-moving metaphors. English-speakers were found to prefer ego-moving metaphors in all of the individual ambiguous time metaphor questions, while Mandarin-speakers were more likely to take time-moving metaphor in all of the individual questions.

In terms of the locus of control responses, English-speakers selected more internal responses on Rotter's I-E scale compared to Mandarin-speakers. However, the difference in the responses selected between them was not significant. This was contrary to previous studies which found that Western individuals tend to have greater perceived internal control than East Asians (Cheng et al., 2013; O'Connor & Schimizu, 2002). It is unclear why such results were obtained. It is possible that East Asians cultures are getting more individualistic due to greater economic, education, and political developments. For instance, recent findings demonstrated that Chinese adults place greater priority on individualist factors (e.g., income, health, employment status) over collectivist factors (e.g., support for collectivist policies) (Steele & Lynch, 2013). This could explain the overall small difference in locus of control responses between English and Mandarin-speakers in this study. However, it cannot be ruled out that the use of I-E scale (Rotter, 1966) which adopted forced choice paradigm (i.e., present two statements in comparative method) might be less able to capture the relative nature of participants' locus of control scores.

Following the linguistic interpretation (McGlone & Harding, 1998), one of the novel hypotheses predicted was that metaphorical representation of time would be related to one's degree of perceived personal control, specifically, endorsement of ego-moving metaphors was expected to be related to higher internal locus of control whereas endorsement of time-moving metaphors was expected to be related to higher external locus of control. However, the results showed that locus of control was not related to the use of time metaphors. One possible explanation for this is that the use of forced choice paradigm in I-E scale (Rotter, 1966) does not measure individual's degree of agreement with the statement.

Based on the findings of previous psychological studies (e.g., Ji et al., 2009; Caruso et al., 2008), it was also predicted that English-speakers would feel subjectively closer to the future whereas Mandarin-speakers would feel subjectively closer to the past. With respect to the overall pattern of psychological distance ratings, English-speakers rated the same day in the past month (vs. future) as subjectively more distant, which is in line with their proposed stronger future orientation. However, Mandarin-speakers did not rate the same day last month to be subjectively closer than the same day one month ahead.

A series of construal questions were used to identify participant's action identification level (i.e. low-level or more concrete alternative represents less psychological distance; high-level or more abstract alternative description represents greater psychological distance). Based on Construal Level Theory (Liberman & Trope, 1998; Trope & Liberman, 2003), individuals' temporal orientation was predicted to be related to the action construal one forms towards the temporal region in question. In other words, individuals who feel subjectively closer to the future (or the past) should represent future actions (or past actions) at a low-level or in more concrete/detailed way. It was predicted that Mandarin-speakers who feel subjectively closer to the past would be more likely to use low-level descriptions for past actions whereas English-speakers who feel subjectively closer to the future would be more likely to use low-level descriptions to represent future actions. However, this relationship did not emerge as Mandarin-speakers were more likely to use high level of descriptions for both past and future actions compared to English-speakers.

It is possible that holistic processing prompts people to focus on the "big picture" which should encourage a more abstract or high-level construal. As previously shown, a high-level construal is related to holistic processing (e.g., in facial recognition – Wyer et al., 2015). This could explain Mandarin-speakers' higher-level representations of past and

future actions in this study, presumably due to their more holistic processing style which encourages them to attend to each action as a whole rather than to its integral components.

The present study was also the first to attempt the investigation on the relationship between the use of time metaphor and psychological distance to the past or future. It has been suggested that the direction of an event's perceived movement is asymmetric as past events move away from the present as opposed to future events which advance towards the present (Caruso et al., 2013). The receding of past events should increase the temporal distance (hence an increased in psychological distance) between those events and the self, whereas the approach of future events should reduce their temporal distance (hence a reduced in psychological distance) from the self. However, correlational analyses revealed that the use of ego-moving metaphors was not related to reduced psychological distance between the self and future events, nor did it relate to greater psychological distance of past events.

Taken together, the findings of Study 1 partially replicated previously observed cultural differences in time-related perceptions especially in relation to the use of time metaphors. As highlighted earlier, one's mental representation of an event is contingent upon the perceived psychological distance between the event in question and the self. Although the results of Study 1 did not replicate the subjectively closer feelings to the future and past by English and Mandarin-speakers respectively, English-speakers' psychological distance ratings were nevertheless in the predicted direction (i.e., they rated the future to be subjectively closer than the past compared to Mandarin-speakers). In the next chapter, the implications of temporal orientation on one's mental representation of past and future events will be investigated. Specifically, following the predictions of CLT, the degree of abstractness (or concreteness) of an event's mental representation should be related to the

perceived psychological distance one feels towards the event in question. Therefore, it is expected that an individual's mental representation of an event would be influenced by the dominant temporal orientation one has. Individuals who feel subjectively closer to a future event would represent it at a more concrete/detailed level and this tendency should be reflected in the phenomenological characteristics of their mental representation of the event. Conversely, individuals who feel subjectively more distant from past event would represent the event at a more abstract/capture the central meaning level and this should be reflected in the phenomenology characteristics of their mental representation. These predictions will be put to the test in Chapter 3.

Chapter 3 - Temporal Orientation: Implications for Mental Representation and Value Judgment

One of the defining characteristics of temporal orientation is the extent to which individuals attend primarily to a particular period of time (e.g., past, present, or future). Individuals' habitual inclination to be cognitively involved in a temporal region varies cross-culturally with individuals from Western societies (e.g., Canadians, North Americans) attending primarily to the future (Caruso et al., 2008; Ji et al., 2009) whereas East Asians (e.g., Chinese) have been found to be oriented towards the past (Guo et al., 2012; Ji et al., 2009). The results in this thesis (Study 1 Chapter 2) thus far suggested that English-speakers feel closer to the future, however, Mandarin-speakers did not feel closer to the past. This result is partially consistent with the previous literature (Caruso et al., 2008; Ji et al., 2009). Next, I sought to continue this line of investigation by examining the phenomenological characteristics of mental representations among individuals from these two cultural backgrounds.

3.1 Temporal Orientation, Psychological Distance, and Mental Representation

As discussed earlier in Chapter 1, CLT states that psychological distance is associated with mental representation. With respect to temporal orientation, if an individual thinks frequently about a temporal region, the events or objects located in that region will be easily brought to mind and appear to be more salient and hence psychologically closer (Guo et al., 2012). Concomitantly, CLT posits that psychologically closer events tend to be

construed in a more detailed, concrete manner compared to psychologically more distant events (Trope & Liberman, 2003). In other words, our preferred mental construal varies as a function of perceived distance of the event in concern (Liberman & Trope, 1998).

Taken together, research on temporal orientation and CLT suggests that Western individuals' and East Asians' predominant temporal orientation might be reflected in the phenomenological aspects of their mental representations, which corresponds to the psychological distance they feel toward the event in question. Specifically, psychologically closer events will be filled with greater contextual details than psychologically more distal events.

One possible explanation for this connection is the notion of perceptual fluency, the ease with which individuals process information about an event or object, which is a cognitive aspect of imagining and recalling experiences. For example, a close or familiar object can be processed more fluently compared to novel ones (e.g., Alter & Oppenheimer, 2008). Similarly, memories of temporally closer (vs. more distant) events contain more detailed contextual information (e.g., spatial, temporal, sensory - D'Argembeau & Van der Linden, 2004).

3.2 Imagination and Memory

In 1983, Tulving proposed a major characteristic that distinguishes semantic and episodic memory, a special type of consciousness termed "autonoetic consciousness" typically accompanies our retrieval of episodic memory. Whilst semantic memory refers to our general knowledge about the world (e.g., Paris is the capital of France or March is the third month of the year), episodic memory represents our recollection of previous personal experiences (e.g., last year's Christmas dinner or my first trip abroad). Our episodic memory

enables us to perform mental “time travel”, by allowing us to cognitively travel to the past or future in order to re-experience the past or pre-experience the future through our auto-noetic awareness. Auto-noetic consciousness refers to *“the kind of consciousness that mediates an individual’s awareness of his or her existence and identity in subjective time extending from the personal past through the present to the personal future”* (Tulving, 1985, p. 1).

By mentally simulating¹⁰ a possible future scenario, we can predict and plan based on our knowledge of a similar past experience which ultimately allows us to make farsighted decisions. For example, frequently mentally simulating a future event increases the perceived likelihood that it will happen in the future (Koehler, 1991) which in turn promotes decisions that are less impulsive and that prioritise long-term benefits (Peter & Büchel, 2010). However, our ability to perform mental simulation also has its drawbacks. For instance, mental images of desired objects enhance their attractiveness and make them less resistible (e.g., craving - Kavanagh, Andrade, & May, 2005). Moreover, intrusive mental images that occur involuntarily have been found associated with various psychological disorders (e.g., posttraumatic stress disorder - Brewin, Gregory, Lipton, & Burgess, 2010; obsessive compulsive disorder – Klein & Moritz, 2014).

As two distinct states of awareness, imagination and memory share some similarities as well as differences. Compared to memory, imagination is more uncertain and less restricted in nature. For instance, people anticipate future events to be more positive in valence compared to past events (Shao et al., 2010), prefer to think that negative future events are more likely to happen to others (vs. ourselves) (unrealistic optimism – Weinstein,

¹⁰ Footnote: Through this thesis, the term “simulate” and “imagine” will be used interchangeably.

1980), and they also overestimate their ability to control future outcomes even when those outcomes are entirely determined by external factors (e.g., a lottery; Langer, 1975). Importantly, imagination is associated with fundamentally different emotions than memory. For instance, nostalgia and disappointment are past-related emotions concerning past occurrences (Helm, 2009; Hepper, Ritchie, Sedikides, & Wildschut, 2012) whereas hope and fear are future-oriented emotions concerned with possible future events (Baumgartner, Pieters, & Bagozzi, 2008).

On the other hand, imagination and memory also share some notable similarities. For instance, previous research suggests an important link between our imagination and memory (see review by Schacter et al., 2012). The act of imagine taps on our memory (e.g., our knowledge of the world) in order to simulate future scenarios (Conway & Pleydell-Pearce, 2000) hence our ability to project ourselves into the future is closely related to our ability to remember past personal happenings (Szpunar, 2010). When asked to imagine events that will likely occur in the future, people's mental representation of events that involved familiar settings (vs. novel settings such as home vs. North pole) were found to contain more sensory details, greater subjective sense of experience, and higher clarity of contextual details (Szpunar & McDermott, 2008) - an indication that mental images of future episodes are likely to be drawn from past episodic memory. Evidently, cognitive neuroscience research shows that our mental simulations of past and future events activate similar neural networks (Addis, Wong, & Schacter, 2007; Okuda et al., 2003; Schacter, Addis, & Buckner, 2008; Szpunar et al., 2007).

3.3 Phenomenological Characteristics of Mental Representation

Images that come to mind of future or past events vary systematically in many phenomenological aspects including vividness, emotionality (e.g., valence and intensity), contextual information (e.g., sensory and spatial), visual perspective among others (D'Argembeau & Van der Linden, 2004; 2006; Libby & Eibach, 2002; Rice & Rubin, 2009; Sutin & Robins, 2007; Van Boven, et al., 2010).

Accordingly, the phenomenological characteristics of our mental representations are contingent upon the perceived psychological distance of the event (Van Boven et al., 2010) as well as the actual temporal distance of event in question from the present (D'Argembeau & Van der Linden, 2004). Mental representations of recent (vs. distant) events tended to contain more sensory and contextual information (D'Argembeau & Van der Linden, 2004; Johnson et al., 1988).

As discussed in Chapter 1, variability in mental representation has been claimed to be one of the contributors of temporal value asymmetry among Western individuals (Van Boven, et al., 2008). For instance, a stronger emotional response during imagination was associated with greater value being assigned to a future event/object and a reduced psychological distance felt (Caruso, 2010; Van Boven & Ashworth, 2007). This indicates that perceived psychological distance is associated with phenomenology (in this case, emotional response) that is generally related to actual psychological distance.

Further supportive evidence comes from Van Boven et al. (2010) who investigated the causal role of emotional response during imagination and observed that emotional intensity reduces psychological distance. They examined the effect of emotional intensity on psychological distance by manipulating the level of emotional intensity participants felt (i.e., participants were assigned either to perform a dance in front of others or to observe other

people dance) then reported their psychological distance to the assigned task. It was found that greater emotion arousal was associated with reduced psychological distance.

Altogether, these findings suggest that emotional intensity reduces psychological distance.

However, the above mentioned empirical research examining the phenomenological aspects of mental representation pertaining to past and future events (Caruso, 2010; Van Boven & Ashworth, 2007; Van Boven et al., 2010) are not cross-cultural studies.

In terms of emotional response, studies on affective forecasting might shed some light on this. Affective forecasting study using cross-cultural comparison approach observed that whilst Western individuals tend to make more extreme prospective affective forecast, East Asians seemed less likely to do so (Lam, Buehler, McFarland, Ross, & Cheung, 2005; Tan & Wyer, 2012). For instance, Tan and Wyer (2012) compared English and Malaysian students with Chinese cultural backgrounds' prospective and retrospective emotional ratings in relation to a target event (i.e., the university break). They found that whilst English students predicted greater happiness than their actual experience, there was no difference between the prediction and actual happiness level of Malaysian students'. This outcome is consistent with previous observations that Western individuals (i.e., Euro-Canadians) exhibited greater affective forecast bias compared to East Asians (Lam, et al., 2005) and also the temporal asymmetry studies reported above (Caruso, 2010; Van Boven & Ashworth, 2007; Van Boven et al., 2010).

Another phenomenological characteristic of interest is the visual perspective in which imagination or memory is experienced. Research has established that in some mental representations, people adopt the viewing position of an outsider, looking at the course of event by using an external point of view. In this perspective, the self is embedded in the scene and is viewed from the outside, hence the term third-person (observer) perspective.

On the other hand, in other mental representations, people seem to take the original point of view, looking at the scene by taking the viewing angle resembles the one in the original scene. This is termed first-person (field) perspective (Nigro & Neisser's, 1983).

Several factors have been proposed to be associated with the use of perspective while imagining possible future events or recalling past occurrences, including assessment of personal change (Libby & Eibach, 2002; Libby, Eibach, & Gilovich, 2005); emotionality (Berntsen & Rubin, 2005; McIsaac & Eich, 2004; Robinson & Swanson, 1993); self-consciousness or self-awareness (Nigro & Neisser, 1983; Robinson & Swanson, 1993); action identification (Libby, Schaeffer, & Eibach, 2009), the authenticity of memory (Justice, Morrison, & Conway, 2013), and recency of memory (Nigro & Neisser, 1983; Sutin & Robins, 1993) among others. However, given that most of these studies were conducted with Western individuals as participants, it remains unknown whether the observed effects would vary as a function of individuals' cultural background.

Interestingly, culture has been proposed as one of the influential factors in the use of visual perspective (see review Cohen, Hoshino-Browne, & Leung, 2007; Martin & Jones, 2012). The use of first-person perspective is more common among Western individuals (e.g., north Americans) whereas the use of third-person perspective is more prevalent among Asian individuals (e.g., Chinese, South Koreans, Singaporeans, Indians) including during personal memories recollection (Cohen & Gunz, 2002; Martin & Jones, 2012; Sutin & Robins, 2007), mind wandering (Christians, Miles, Parkinson, & McCrae, 2013), and online imagery (Cohen et al., 2007).

The systematic variation in the use of visual perspective between Western and Asians has been claimed to have its roots in cultural dimensions. For instance, Martin and Jones (2012) examined the relationship between memory perspective and cultural

individualism of individuals from 26 countries. Individualism scores were found to be a predictor of perspective use during memory recollection (memories for receiving an important piece of news) such that the use of first-person and third-person perspective were more common among relatively individualistic and relatively collectivistic countries respectively. Although this finding is correlational in nature, it is nevertheless consistent with the insider vs. outsider phenomenology account put forward by Cohen, et al (2007), who claimed that the systematic difference between the characteristics of individualistic and collectivistic societies encourage individuals to adopt one perspective over the other.

According to Cohen et al. (2007), the relative greater emphasis on personal autonomy and self-esteem in individualistic (vs. collectivistic) societies encourages individuals to adopt an insider's perspective (i.e., first-person) because one's internal feelings and thoughts are prioritised over the judgments or viewpoints of other people. This is because the use of first-person perspective heightens one's own feelings and thoughts which are important for action guidance. On the contrary, an outsider's perspective (i.e., third-person) is far more adaptive and functional in a collectivistic (vs. individualistic) society where interpersonal relationships are valued over personal autonomy. It enables them to be more aware of how they appear in others' eyes to ensure that their social behaviour is congruent with the expectations of others. This is deemed a more practical approach from a social point of view as others' judgments and evaluations are important for self-assessment (Kim, Cohen, & Au, 2010).

The suggestion of a connection between the use of visual perspective and the extent to which individuals care about how they appear to others is supported by Uskul and Kikutani (2014) who investigated the effect of visualisation on motivation to engage in health behaviours. They found that the use of third-person perspective (vs. first-person) was

associated with stronger intentions to engage in a publicly visible health behaviour for individuals who were more concerned about other people's evaluations or judgments of themselves. This indicates that perspective use is guided by an individual's concerns, values, and goals.

On the other hand, differences in visual perspective preferences between Western and Asian cultures can also be explained by cultural variation in visual attention (Masuda et al., 2008). Several experiments using a variety of tasks that involved focal objects being presented against a contextual background (e.g., rod and frame task – Ji et al., 2000; the underwater scene – Masuda & Nisbett, 2011) confirm that East Asians have difficulty ignoring the background information compared to their Western counterparts. This more contextual or relationship-oriented attentional strategy is claimed to be a characteristic of holistic thinking style in which the essence of understanding is by attending to the elements and the field as a whole (Nisbett et al., 2001).

Conversely, the use of first-person perspective in which one sees the world from one's own viewpoint is more object-focused and thus less attention is paid to the wider background. This line of attentional strategy is compatible with Westerners' more analytical thinking style, and their ability to devote their attention largely to the focal objects by paying relatively little attention to the contextual background (Nisbett et al., 2001), as discussed previously in Chapter 1. Taken together, the cultural variation in visual perspective preference between East Asian and Westerners seems to be consistent with their preferred attentional strategy and habitual thinking style (holistic vs. analytical).

Concomitantly, studies examining differences in first-person and third-person memory contents (McIsaac & Eich, 2002; 2004) confirmed this line of reasoning. Whilst first-person memories were found to contain greater amount of information pertaining to

emotional, sensory, and psychological aspects that people experience during the course of event, third-person memories afforded more details about their own physical appearance, actions, and the relative spatial arrangement of objects.

Accordingly, the present research aims to investigate the phenomenological characteristics of individual's past and future mental representations from cultural comparison perspective. If Western individuals are more future oriented, they should pay more attention to the future and think about future more often. Consequently, future (vs. past) events or objects should be more easily brought to mind and feel psychologically closer. Comparably, if East Asians are more past oriented, they should think relatively more about the past, and the past should appear to be psychologically closer to them (vs. future). Following the prediction of CLT that the characteristics of our mental representations toward an entity in question (e.g., people, event, action, choices) should correspond to its perceived psychological distance, I predicted that one's temporal orientation might be reflected in the phenomenological aspects of mental representation that individuals form in relation to past or future events.

Overview of studies in this chapter

The studies reported in the present chapter investigated the relationship between temporal orientation and mental representation (Study 2 & 3) and explored the potential downstream effect of temporal orientation on item valuations (Study 4). English and Mandarin-speakers were asked to imagine and recall an identical event (Study 2) and some personal events (Study 3) then report phenomenological characteristics of their mental representation of these events. Study 4 explored the relationship between thinking about the past, mental representation, and valuation judgments of nostalgic items.

3.4 Study 2: Temporal Orientation, Culture, and Mental Representation I

3.4.1 Introduction

Building on existing research of temporal value asymmetry which demonstrated that individual's temporal orientation that varies as a function of cultural background influences people's mental representations (Caruso et al., 2008; Caruso, 2010; Van Boven & Ashworth, 2007; Van Boven et al., 2010), this study investigated the possibility that the phenomenological characteristics of mental representation is grounded in and influenced by perceived psychological distance.

Whilst numerous non-cross-cultural temporal value asymmetry studies (i.e., Western participants - Caruso et al., 2008; Caruso, 2010, Van Boven & Ashworth, 2007) demonstrated that temporal value asymmetry is associated with the mental representation phenomenological characteristics (e.g., emotional intensity) in relation to a future event in concern, the same is yet to be replicated with East Asian participants.

The use of visual perspective in mental representation is another phenomenological characteristic that varies cross-culturally. Cultural variations in the use of visual perspective has been reasoned to be related to the characteristics of collectivistic vs. individualistic cultures (Martin & Jones, 2002) or the dominant holistic vs. analytical thinking style (Masuda et al., 2008) observed among East Asians and Western individuals respectively.

Further studies showing that memory contents differ cross-culturally makes the suggestion of a connection between perspective use and memory content even more compelling. When asked to provide memories from any period of their lives, European Americans tended to provide memories with the self as the focus of the event such as personal experience, whereas Chinese tended to recall memories that are generally "broader", more socially oriented that contain significant others (Wang & Conway, 2004;

Wang & Ross, 2005). In addition, the analysis on Chinese individual's memory narrative showed that they tended to mention other people more often as opposed to themselves (i.e., a higher other/self ratio) compared to Americans (Wang & Conway, 2004). This tendency appears to be in-line with their interdependent self-view and holistic thinking style – seeing elements as embedded in a wider context. As visual perspective used in memory retrieval was never measured in the above-mentioned autobiographical memory studies, it remains unknown whether their observation of cultural variations in memory content was due to the perspective use in recollection.

The above considerations lead to several predictions pertaining the cultural differences in phenomenological characteristics of mental representation as a function of temporal orientation. The phenomenological characteristics that are of particular interests are psychological distance, emotional intensity, visual perspective, and contextual details (e.g., spatial, visual, and sensory details, other/self ratio).

Firstly, based on CLT and the greater future and past emphasis observations among Westerners and East Asians respectively, Western individuals are expected to feel closer to an event during imagination (vs. memory) whereas East Asians would feel closer to the event during recollection (vs. imagination).

Secondly, based on previous findings of a greater affective forecasting bias (Wilson et al., 2000; Lam et al., 2005) and a greater reported affect when contemplating future events (Caruso et al., 2008) among Westerners (vs. East Asians), it is thus predicted that English-speakers would report more intense emotional responses during imagination (vs. memory) whereas Mandarin-speakers would not exhibit such tendencies.

Thirdly, it was predicted Mandarin-speakers will be more likely to use third-person perspective compared to English-speakers due to the largely social nature of the target

event, as previous related work suggests that the use of third-person perspective among East Asians is more prevalent in social settings (Cohen & Gunz, 2002). In addition, Mandarin-speakers' mental representations should contain greater other/self ratio compared to that of English-speakers.

In order to make a meaningful cross-cultural comparison, participants were asked to imagine (two weeks prior to the event) and then to recall retrospectively (two weeks after the event) an event characterised by specific traditions: Christmas dinner for English-speakers and Chinese New Year Reunion dinner for Mandarin-speakers. These two events share some similarities between English and Mandarin-speakers such that both are meals that often contain substantial food traditionally eaten once a year with family members. They are significant and meaningful festive gatherings for family to get together for the purpose of celebration. The phenomenological characteristics of their mental representations were measured by asking them to complete the mental imagery questionnaire adapted and modified from D'Argembeau and Van der Linden (2006). Participants were also asked to provide an account of the event in as much detail as possible. These accounts were subjected to content analysis in order to examine the phenomenological characteristics of their mental representation (e.g., emotionality, spatial details, other visual details, other/self ratio, self-as-agent, and self-as-referent) as well as whether the self was mentioned as an agent or as a referent.

Due to the possibility of cultural differences between the two target events (i.e., Christmas dinner vs. Chinese New Year Reunion dinner), the main interest in this study is the temporal pattern for each outcome (i.e., main effect of representation type and culture x representation type interaction) instead of the direct comparison of culture.

3.4.2 Method

Participants

The sample size was determined by referencing a related cross-cultural study (Ji, et al., 2009). With an effect size of $d = .45$, G*Power analysis (Faul, Erdfelder, Buchner, & Lang, 2009) showed that a sample size of at least 62 in each cultural group was required to reliably detect a difference in psychological distance with 0.80 power. Ninety-seven English students from University of Plymouth (89 females) and 120 students in China (74 females) participated in this study online¹¹. They ranged from 18 to 25 years-old. English students were recruited using psychology student pool at University of Plymouth. They participated in the study in-exchange for course credit. Chinese students were recruited using an online survey platform (www.sojump.com). They participated in the study in-exchange for a chance to take part in a lucky draw contest.

Only 57 English-speakers and 44 Mandarin-speakers were included in the analysis after data screening exercise. The responses were excluded because: did not complete the questionnaire within the designated time frame (4 English-speakers and 10 Mandarin-speakers); non-native English/Mandarin-speaker (1); did not participate in the target event (1); did not provide a written account of the target event (1); and provided written accounts unrelated to the target event (7).

Materials

Participants completed the mental imagery questionnaire that was adapted and modified from D'Argembeau and Van der Linden (2006) which contained 17 questions that

¹¹ Out of the 97 English students who completed the first part of the study, 64 completed the second part of the study. Out of the 120 Chinese participants who completed the first part of the study, 61 completed the second part of the study.

were presented in random order. The rating scales used to assess participants' phenomenological characteristics of event representation are shown in Table 3.1.

Design

This study adopted a 2 Culture (English, Mandarin) x 2 Representation type (Imagination, Memory) mixed-ANOVA design, with culture being a between-participants variable and representation type as a within-participant variable.

Table 3.1 Rating scales used to assess the phenomenological characteristics associated with imagining/remembering future and past events in Study 2. Adapted and modified from D'Argembeau and Van der Linden (2006).

Characteristic	Brief description of rating scale
Psychological distance	A future event/Past experience may feel quite close or quite far away, regardless of how long ahead/ago it will occur/actually occurred. How far away does this event feel to you: 1 = very close; 7 = very far away
Visual perspective	While imagining/remembering the event, my visual perspective was: 1 = entirely looking through my eyes to; 7 = I can see myself in the imagination/memory
Autonoetic consciousness	Average of <i>pre-experiencing/re-experiencing</i> and <i>mental time travel</i>
Pre-experiencing/ Re-experiencing	While imagining/remembering the event, I felt as though I was experiencing/reliving it: 1 = not at all; 7 = completely
Mental time travel	While imagining/remembering the event, I felt that I traveled forward/back to the time when it would happen/happened: 1 = not at all; 7 = completely
Visual details	My imagination/memory for this event involved visual details: 1 = none; 7 = a lot
Other sensory details	Average of <i>sounds</i> and <i>smells/tastes</i>
Sounds	My imagination/memory for this event involved sounds: 1 = none; 7 = a lot
Smells/tastes	My imagination/memory for this event involved smells/tastes: 1 = none; 7 = a lot
Spatial context	Average of <i>clarity of location</i> , <i>clarity of object layout</i> , and <i>clarity of people layout</i>
Clarity of location	My imagination/memory for the location where the event will take place/takes place was: 1 = not at all clear; 7 = very clear
Clarity of object layout	The layout of objects in my imagination/memory for the event was: 1 = not at all clear; 7 = very clear
Clarity of people layout	The layout of people in my imagination/memory for the event was: 1 = not at all clear; 7 = very clear
Temporal information	My imagination/memory for the time of day when the event will take place/takes place was: 1 = not at all; 7 = completely
Feeling emotions	While imagining/remembering the event, I felt the emotions I would feel/felt if/when the event occurred: 1 = not at all; 7 = completely
Intensity	If/When this event happened, my emotions would be/were: 1 = not intense; 7 = very intense
Valence	If/When this event happened, my emotions would be/were: 1 = very negative; 7 = very positive
Personal importance	This event is important to me (it involves an important theme or episode in my life): 1 = not at all important; 7 = very important
In words	While imagining/remembering the event, it comes to me in words: 1 = not at all, 7 = a lot
Coherent story	While imagining/remembering the event, it comes to me as a coherent story and not as an isolated scene: 1 = not at all; 7 = completely

Procedure

The study took place December 2016 and February 2017. The target event for study was Christmas dinner (25th Dec 2016) for English-speakers and Chinese New Year Reunion dinner (27th Jan 2017) for Mandarin-speakers. The data cut-off time was within 3 days from the 2 weeks before/after the target event. All the participants completed the study online. Participants completed the study over two sessions. In the first session, participants received the imagination questionnaire approximately two weeks before the target event. In the second session, they completed the recall questionnaire approximately two weeks after the target event.

Participants who clicked on the study link were first directed to a page which contained a brief introduction of the study. They were then asked to give their informed consent for their participation followed by some basic demographic information (e.g. sex, age, first language, country of birth, and country of residence at time of participation) prior to the start of the questionnaire.

Participants were asked to make sure that they pay full attention while completing the study and turn-off background music or video. After reading the instructions, they were instructed to close their eyes to spend one minute imagining the coming Christmas Dinner (or Chinese New Year Reunion Dinner for Mandarin-speakers) in as much detail as possible. Participants clicked the 'continue' button when they were ready to start the task and a 'beep' tone went-off when the one minute was up. After that, they spent four minutes writing down an account of the event they have just imagined in as much detail as possible. Participants were informed that they were not required to disclose any information they feel uncomfortable with or do not wish to disclose. They then completed the mental imagery questionnaire adapted from that of D'Argembeau & Van der Linden's (2006). Upon

completion of the study, participants were thanked and debriefed. Participants were contacted approximately two weeks after the target event to complete part-two of the study. In the second part of the study, they were asked to repeat an identical procedure as in part-one of the study, instead of imagining they were asked to recall the target event.

Mental representation account coding:

The event accounts provided by participants were subjected to narrative coding. The account coding exercise intended to extract further information about the phenomenological characteristics of participants' mental representations. A coding scheme was developed based on the categories of phenomenological characteristics in the mental imagery scale (D'Argembeau & Van der Linden, 2006) and a cross-cultural autobiographical memory study (Wang & Conway, 2004) that coded memory content using several variables. All the account coding was performed using participants' responses in their original language.

Two coders who were blind to the study hypothesis coded the accounts independently. Mandarin and English-speakers' accounts were coded by a native Mandarin-speaker and a native English-speaker respectively following the same guidelines. A third (bilingual) coder coded both data set for inter-coder reliability estimates. The agreement between two coders was 90.45% for English accounts and 87.40% for Mandarin accounts. Disagreements about coding were resolved by referring to the coding rules.

It is worth noting that due to the involvement of two different languages, an identical concept might need different numbers of words/characters to express in different languages, therefore number of items/components (i.e., distinct idea) will be used as an indication of account length instead of number of words/characters. This applies to all the

phenomenological characteristics account coding. To give an example, for descriptions in relation to sound, 'telling jokes' and 'lots of laughter' were coded as 1 item each respectively. Similarly, '笑声连连' (continuous laughs) and '鞭炮声' (the sound of fireworks) were coded as 1 item each respectively.

Emotionality. The number of emotional items/components in participants' accounts was coded and counted for each account.

Sensory details such as sound and smells/tastes. The number of sound and smells/tastes related items/components in participants' accounts was coded and counted for each account respectively.

Spatial details. The number of spatial details (e.g., object, people) related items/components in participants' accounts was coded and counted.

Other visual details. The number of other visual details (e.g., colour, specific item description) in participants' accounts was coded and counted.

Other/self ratio. The number of every other people and self-related components was counted and an 'other/self ratio' was calculated for each account. This includes all the first-person and third-person pronouns, titles, names (e.g., I, me, mom, brother, she, them). The number of the self being mentioned was broken down according to the function of the self in the account: 1) self-as-agent – the self being referenced as an agent or a source of action (e.g., *I* read the jokes inside the Christmas cracker out loud; *we* all have a glass of wine); and 2) self-as-referent – the self being used as a referent (e.g., my grandma is so proud of *me*; the dog is sat begging for food next to *me*).

3.4.3 Results

Post-hoc power analysis (Faul, et al., 2009) revealed that with a sample size of 101, effect size of 0.45, the power achieved to detect the difference in psychological distance was .72. See Appendix B for imagination and memory account examples.

Prior to conducting the analysis, the self-reports for “autonoetic consciousness” were produced by averaging the responses to “feeling of pre-experiencing (or re-experiencing)” and “feeling of traveling forward (or backward) to the event happening time” (Cronbach’s $\alpha_{imag} = 0.78$; Cronbach’s $\alpha_{mem} = 0.78$); similarly, the ratings of spatial context were produced by averaging responses regarding the “clarity of location”, “clarity of object layout” and “clarity of people layout” (Cronbach’s $\alpha_{imag} = 0.71$; Cronbach’s $\alpha_{mem} = 0.71$).

In order to understand if phenomenological ratings differed according to culture, representation type, and type of phenomenological characteristic, a repeated-measure multivariate analysis of variance (MANOVA) was conducted with all the phenomenological ratings (28 measures) as dependent variables, culture as between-participants variable, whereas representation type and phenomenological characteristic as within-participant variables. As shown in Table 3.2, using Pillai’s Trace, all the main effects (all F ’s > 13.52, p ’s < .001) and the interaction effects (all F ’s > 5.57, p ’s < .02) reached statistical significance.

Table 3.2 Results of MANOVA performed for the phenomenological ratings by culture, representation type, and type of phenomenological characteristic for Study 2

	Multivariate Test				
	<i>V</i>	<i>F</i>	Hypothesis <i>df</i>	Error <i>df</i>	η^2_p
Culture		13.52 ***	1	99	0.12
Representation	0.45	80.98 ***	1	99	0.45
Phenomenal	0.80	26.15 ***	13	87	0.80
Culture*Representation	0.06	6.04 *	1	99	0.06
Culture*Phenomenal	0.45	5.57 ***	13	87	0.45
Culture*Representation*Phenomenal	0.48	6.14 ***	13	87	0.48

* $p < .05$. ** $p < .01$. *** $p < .001$.

Next, a series of univariate analysis of variance (ANOVA) were conducted for each of the phenomenological characteristic with culture as a between-participants variable and representation type as a within-subject variable. The means, standard deviations, main effects, and interaction effects are presented in Table 3.3 as a function of culture and mental representation type. The result analysis will be broken down and presented in three sections, namely psychological distance, visual perspective, and all the other phenomenological characteristics.

Table 3.3 Self-reports of phenomenological characteristics of mental representations by culture and mental representation type for Study 2.

	English (n = 57)				Mandarin (n = 44)				Main effects				Interact. effects	
	Imagination		Memory		Imagination		Memory		Eng vs Man		Ima vs Mem		Eng/Man*Ima/Mem	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p
Psychological distance	3.26 _a	1.78	4.09 _b	1.65	3.39	1.98	3.16	1.72	2.22	.02	1.64	.02	5.09 *	.05
Visual perspective	3.19	2.26	3.44	2.32	5.27	1.58	5.32	1.44	31.64 ***	.24	0.59	.01	0.28	.00
Autonoetic consciousness	4.68	1.31	4.76	1.20	5.48	0.96	5.57	1.20	15.61 ***	.14	0.46	.01	0.00	.00
Visual details	6.33	0.81	6.40	0.86	5.75	0.94	5.84	0.89	17.77 ***	.15	0.53	.01	0.01	.00
Sounds	4.60	1.80	4.14	1.69	5.59	1.13	5.43	1.17	20.92 ***	.17	3.12	.03	0.73	.00
Smells/tastes	4.46	1.79	4.84	1.76	5.09	1.27	5.16	1.26	3.19	.03	1.78	.02	0.87	.01
Spatial context	6.23	1.02	6.35	0.85	5.67	0.88	5.85	0.79	11.30 ***	.10	2.76	.03	0.10	.00
Temporal information	5.26	1.60	6.05	1.25	5.73	1.00	6.09	0.94	1.67	.02	13.09 ***	.12	1.79	.02
Feeling emotions	5.09	1.46	5.21	1.19	5.73	1.02	5.80	1.09	8.93 **	.08	0.51	.01	0.04	.00
Emotions intensity	5.23 _a	1.15	4.84 _b	1.40	5.50	1.11	5.43	0.97	4.70 *	.05	3.05	.03	1.49	.02
Emotions valence	6.28	0.98	5.79	1.37	5.89	1.17	5.75	1.08	1.22	.01	6.23 *	.06	2.00	.02
Personal importance	5.70 _a	1.35	5.18 _b	1.40	5.75	1.42	5.73	1.13	1.60	.02	4.90 *	.05	4.12 *	.04
In words	3.93	1.64	3.81	1.74	5.32	1.18	5.27	1.42	28.62 ***	.22	0.30	.00	0.06	.00
Coherent story	4.86	1.57	4.98	1.47	5.55	1.52	5.84	1.12	9.13 **	.08	2.35	.02	0.40	.00

Note: Values for autonoetic consciousness and spatial context refer to mean average. Rating scales: psychological distance: 1=very close; 7=very far away; visual perspective: 1=entirely looking through my eyes; 7=I can see myself in the imagination/memory; autonoetic consciousness: 1=not at all; 7=completely; visual/sounds/smells/tastes sensory details: 1=none; 7=a lot; spatial context: 1=not at all clear; 7=very clear; feeling emotions: 1=not at all; 7=completely; emotion intensity: 1=not intense; 7=very intense; emotion valence: 1=very negative; 7=very positive; personal importance: 1=not at all important; 7=very important; in words: 1=not at all; 1=a lot; coherent story: 1=not at all; 7=completely.

Means not sharing a common subscript (a, b) are not statistically different at $p < .05$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Psychological distance

There was a culture X representation type interaction, $F(1, 99) = 5.094, p = .026, \eta^2_p = .049$. Post-hoc tests analysis using Bonferroni adjustment ($\alpha = .025$) revealed that English-speakers felt psychologically closer to the event during imagination (vs. memory), $F(1, 99) = 7.185, p = .009, \eta^2_p = .068$ whereas there was no difference between Mandarin-speakers' imagination and memory ratings, $F(1, 99) = 0.421, p = .518, \eta^2_p = .004$. Cross-cultural comparisons showed that there was no difference between English and Mandarin-speakers' psychological distance ratings during imagination [$F(1, 99) = 0.108, p = .743, \eta^2_p = .001$], however, Mandarin-speakers felt psychologically closer to their memory compared to English-speakers, $F(1, 99) = 7.559, p = .007, \eta^2_p = .071$.

Visual perspective¹²

Mandarin-speakers reported that their mental representations were more likely to be in third-person perspective compared to English-speakers, $F(1, 99) = 31.643, p < .001, \eta^2_p = .242$.

Other self-report phenomenological characteristics

In relation to main effects of representation type (i.e., imagination vs. memory), both cultures rated their memory to contain clearer temporal information than their imagination, $F(1, 99) = 13.093, p < .001, \eta^2_p = .117$. The target event was also rated as emotionally more positive [$F(1, 99) = 6.230, p = .014, \eta^2_p = .059$] and personally more

¹² Previous research (Huebner & Fredrickson, 1999; Rice & Rubin, 20009) observed that females tended to experience third-person perspectives more than males. Therefore, a repeated-measure ANOVA with culture and gender as between-participants variables and the use of visual perspective as within-participant variable was conducted. There was no significant main effect or interaction effect of gender on the use of visual perspective (all F 's $< 1.677, p$'s $> .198$).

important during imagination compared to memory [$F(1, 99) = 4.902, p = .029, \eta^2_p = .047$].

The effect of time point on personal importance was moderated by culture [$F(1, 99) = 4.124, p = .045, \eta^2_p = .040$] with post-hoc analysis (Bonferroni adjustment $\alpha = .025$) revealed that English-speakers rated the event to be more important during imagination (vs. memory) [$F(1, 99) = 10.339, p = .002, \eta^2_p = .095$] whereas the difference was absent for Mandarin-speakers [$F(1, 99) = 0.015, p = .903, \eta^2_p < .001$].

For emotional intensity ratings, I was interested to know whether English-speakers would show greater affective forecast bias compared to Mandarin-speakers who should be less likely to do so. Therefore, a separate paired sample t -test was conducted for each of the cultural group respectively. The results showed that English-speakers reported experiencing more intense emotional response during imagination (vs. memory) [$t(56) = 2.065, p = .044, d = 0.31$] whereas the difference was absent for Mandarin-speakers [$t(44) = 0.401, p = .691$].

Mental representation account coding

In addition to the mental imagery scale, participants also provided a short account of their mental representations. All the account coding were subjected to a 2 Representation type (imagination, memory) \times 2 Culture (English, Mandarin) ANOVAs for each of the phenomenological characteristic respectively included frequency of items/components related to emotions, sensory details of sound, sensory details of smells/tastes, spatially related details, other visual related details, the ratio of other/self, the frequency of other people, the self as an agent, the self as a referent in the accounts. Together with means and standard deviations of account coding counts, the main effects and interaction effects as a function of culture and representation type are presented in Table 3.4.

Table 3.4 Means and standard deviations of mental representations account coding counts by culture and mental representation type for Study 2.

	English ($n_1 = 57$; $n_2 = 50$)				Mandarin ($n_1 = 44$; $n_2 = 21$)				Main effects				Interact. effects			
	Imagination		Memory		Imagination		Memory		Eng vs Man		Ima vs Mem		Eng/Man*Img/Mem			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p		
Emotionality	0.88	1.02	1.07	1.64	0.68	0.83	0.57	0.62	3.49	.03	0.09	.00	1.40	.01		
Sound	2.14 _a	1.48	1.05 _b	0.91	0.77	0.86	0.61	0.87	30.02 ***	.23	19.07 ***	.16	10.58 **	.10		
Smells/tastes	0.26 _a	0.58	0.51 _b	0.87	0.25	0.44	0.20	0.46	2.23	.02	2.12	.02	4.48 *	.04		
Spatial details	2.68 _a	1.79	1.58 _b	1.48	0.84	0.96	0.70	0.76	38.47 ***	.28	14.44 ***	.13	8.79 **	.08		
Other visual details	2.39 _a	1.99	1.26 _b	1.41	0.55	0.85	0.70	0.98	28.01 ***	.22	7.51 **	.07	13.29 ***	.12		
Other/self ratio	1.95	2.10	1.32	1.36	3.17	2.33	2.61	2.29	8.66 **	.11	4.84	.07	0.18	.00		
Others	6.12	3.73	5.84	3.75	3.77	3.40	3.98	3.07	12.70 ***	.11	0.10	.00	0.39	.00		
Self-as-agent	3.79	2.90	4.32	3.11	0.70	0.85	1.18	1.32	58.34 ***	.37	4.09 *	.04	0.10	.00		
Self-as-referent	1.56	1.66	1.72	1.68	0.20	0.51	0.18	0.45	48.12 ***	.33	0.19	.00	0.34	.00		

Note: n_1 represents the sample size for emotionality, sound, smells/tastes, spatial details, and other visual details whereas n_2 represents the sample size for other/self ratio, frequency of others, self-as-agent, and self-as-referent counts.

Means not sharing a common subscript (a, b) are not statistically different at $p < .05$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

As can be seen from Table 3.4, regarding the main effect of culture, English-speakers' accounts contained more sound-related components [$F(1, 99) = 30.017, p < .001, \eta^2_p = .233$], more spatial details related components [$F(1, 99) = 38.471, p < .001, \eta^2_p = .280$], and also greater other visual details [$F(1, 99) = 28.006, p < .001, \eta^2_p = .221$] than Mandarin-speakers at both time points.

In terms of main effect of representation type, imagination accounts contained more descriptive components about sound [$F(1, 99) = 19.065, p < .001, \eta^2_p = .161$], spatial context related [$F(1, 99) = 14.435, p < .001, \eta^2_p = .127$], and other visual details [$F(1, 99) = 7.510, p = .007, \eta^2_p = .071$] compared to memory accounts.

In addition, there was a culture X representation type interaction on sound-related components [$F(1, 99) = 10.576, p = .002, \eta^2_p = .097$]; smells/tastes sensory details [$F(1, 99) = 4.482, p = .037, \eta^2_p = .043$]; spatial details [$F(1, 99) = 8.790, p = .004, \eta^2_p = .082$]; and other visual details [$F(1, 99) = 13.287, p < .001, \eta^2_p = .118$]. Post-hoc tests (Bonferroni adjustment $\alpha = .025$) indicated that English-speakers' imagination accounts (vs. memory) contained greater sound-related components [$F(1, 99) = 33.308, p < .001, \eta^2_p = .252$]; smells/tastes related [$F(1, 99) = 7.326, p = .008, \eta^2_p = .069$]; spatial details [$F(1, 99) = 26.256, p < .001, \eta^2_p = .210$]; and other visual details [$F(1, 99) = 23.400, p < .001, \eta^2_p = .191$]. However, there was no difference between Mandarin-speakers' imagination and memory ratings - sound related [$F(1, 99) = 0.550, p = .460, \eta^2_p = .006$]; smells/tastes related [$F(1, 99) = 0.194, p = .661, \eta^2_p = .002$]; spatial related [$F(1, 99) = 0.309, p = .580, \eta^2_p = .003$]; and other visual details [$F(1, 99) = 0.363, p = .548, \eta^2_p = .004$].

Regarding the ratio of other to self, Mandarin-speakers made comparatively greater mention of others at both time points compared to themselves than English-speakers [$F(1, 69) = 8.657, p = .004, \eta^2_p = .111$]. In addition, imagination accounts contained greater

other/self ratio than memory accounts [$F(1, 69) = 4.835, p = .031, \eta^2_p = .065$]. The frequency of the self being mentioned in the accounts was broken down into two categories with the self being mentioned as an agent/actor or as a referent. English-speakers' accounts contained greater number of the self being used both as an agent [$F(1, 99) = 58.34, p < .001, \eta^2_p = .371$] and as a referent [$F(1, 99) = 48.123, p < .001, \eta^2_p = .327$] than Mandarin-speakers. Memory accounts contained greater frequency of the self being mentioned as an agent than imagination's [$F(1, 99) = 4.091, p = .046, \eta^2_p = .040$].

3.4.4 Discussion of Study 2

The purpose of this study was to examine the phenomenological characteristics of mental representation associated with projecting oneself into the past and the future in relation to an identical event.

Based on CLT and on previous research suggesting that Westerners feel psychologically closer to the future whilst East Asians feel psychologically closer to the past, it was predicted that members of the two cultures would differ in their representations of future and past events in a number of ways. Firstly, English-speakers were expected to feel psychologically closer to a future event whereas Mandarin-speakers were expected to feel psychologically closer to a past event.

The results showed that English-speakers rated the event to be psychologically closer during imagination (vs. memory). This is consistent with their future orientation established in the literature (Caruso et al., 2008; Caruso, 2010; Caruso et al., 2013) and English-speakers' psychological distance rating pattern observed in this thesis (Chapter 2 - Study 1). However, Mandarin-speakers rated the target event as equidistant (imagination vs.

memory) which is contrary to previous findings of a stronger past orientation among East Asians (Guo et al., 2012; Ji et al., 2009).

Secondly, it was predicted that English-speakers should report more intense emotional responses during imagination (vs. memory) whereas Mandarin-speakers would not exhibit such a tendency. The results are as predicted showing that English-speakers reported more intense emotions when they imagined the future target event (relative to the past) whereas Mandarin-speakers reported equivalent levels of emotional intensity for their imagination and memory. English-speakers' findings are consistent with their reduced psychological distance during imagination (vs. memory) and also the suggestion that greater emotional experience is typically associated with reduced psychological distance (Van Boven et al., 2010). On the other hand, Mandarin-speakers' non-differentiated emotional responses (imagination vs. memory) is also in-line with their absence of a difference between prospective and retrospective psychological distance ratings.

The self-report and account coding outcomes on mental representation phenomenological characteristics are broadly consistent with participants' psychological distance felt toward the event. For instance, English-speakers' imagination accounts were found contained more contextual details including sensory details of sound, spatial, and also other visual details compared to their memory accounts. They rated their imagination as more emotionally intensified than their memory, and they also rated the event as personally more important during imagination (vs. memory). These are consistent with their reduced psychological distance to the event during imagination (vs. memory) hence demonstrating a stronger future orientation.

On the other hand, Mandarin-speakers rated the event as equidistant prospectively and retrospectively. There was no difference in their emotional intensity rating while

imagining or remembering. Furthermore, there is an absence in difference between imagination and memory in many phenomenological characteristics including both self-report measure (e.g., visual details, sensory details of sound and smells/tastes, spatial information) and account coding outcome (e.g., spatial details, sensory details of sound and smells/tastes, other visual details). These findings are compatible with their lack of a difference in psychological distance rating towards the event prospectively and retrospectively.

For the third hypothesis in which it was predicted that the use of visual perspective will vary as a function of culture, the expected difference emerged. Mandarin-speakers were more likely to use third-person perspective for both imagination and memory representation compared to English-speakers. The target event of this study, a family festive gathering, should promote more use of a third-person perspective among Mandarin-speakers because it is largely social in nature which typically involved the presence of significant others. This outcome is consonant with previous observations that the use of third-person perspective is common among East Asians especially in a social context (Cohen & Gunz, 2002; Cohen, et al., 2007) as a result of their greater sense of interdependent self as opposed to Western individual's greater sense of independent self (Markus & Kitayama, 1999).

Concurrently, a tendency to see oneself as part of a wider social network among East Asians is also evident in Mandarin-speakers' proportionately greater mention of other people as opposed to themselves compared to English-speakers, a finding that is consistent with previous studies (Wang & Conway, 2004). The function of self being mentioned in the account as either an agent or a referent was differentiated. It revealed that both English and Mandarin-speakers were more likely to mention themselves as an agent in their accounts.

There are some aspects of the account coding outcomes appear to be incompatible with the self-report measure outcomes. It is possible that there might be other mechanisms at play when participants were asked to describe their mental representation. For example, when asked to provide an account of mental representation, participants might choose to focus on specific aspects due to the influence of personal goals and intentions. Thus, they might prefer to elaborate on certain features of their mental representation in accordance with the focus of their attention.

Take spatial details for example: whilst there was no difference in the self-report rating measure, imagination accounts were found to contain more spatial details compared to memory accounts. Spatial context is one of the defining features of mental representation. It is possible that when participants were asked to describe their imagination, they felt it more necessary to construct the spatial scenery before they elaborate on other details in order to create a coherent representation in order to convey their imagination to the readers effectively. On the other hand, when describing memory representations, participants might focus less on the spatial scenery but instead more on other specific details as they were likely to be very familiar with the location of the event hence the spatial details. This is because Christmas dinner and Chinese reunion dinner are repeated events that take place annually and likely to be at a familiar setting. Therefore, spatial context should play a less important role when participants describe their memory. Therefore, it makes sense that some of the outcomes of self-report measure and account coding outcomes appear to be incongruous with each other.

Some intriguing observations were noticed in relation to the way participants describe their mental representation accounts. Judging by the event accounts provided by Mandarin-speakers, it would seem that their accounts contained greater details regarding

the progress of the target event (i.e., take place over a longer period of time – from atmosphere to getting ready for dinner then carry on to the actual dinner) compared to the more ‘dinner’ focused accounts provided by English-speakers. It is possible that there might be a difference in the cultural nature of the event. Whilst the two events share some similarities (e.g., typically involved family gathering, preparation and eating a large meal, decoration of homes, watching festive-related tv programmes), Christmas dinner involved exchange of presents whereas Chinese reunion dinner involves married couples giving out red packets (a monetary gift) to single people or children. Nevertheless, the observed difference in narrative styles between English and Mandarin-speakers resonates with the relatively more specific versus generic memory narrative observed among Western individuals and Chinese individuals respectively (Wang & Conway, 2004). This is also consistent with the dominant information processing style found among Western and East Asian individuals (i.e. analytical vs. holistic) which is likely to exert influence on their narrative style due to the relatively greater attention they pay to the focal objects and the peripheral details respectively (Masuda & Nisbett, 2001).

As a caution, as the target event in this study was only approximately two weeks away when participants were asked to perform the imagination or memory tasks, it is possible that the seemingly close objective temporal distance and also the festive atmosphere surrounding might affect their perceived psychological distance of the event and hence their mental representation. One possible way to rule out this explanation would be to examine how objective temporal distance affects people’s perceived psychological distance. The next study intended to address this issue by extending the investigation to events located at different temporal regions (i.e. close vs. distant). Another group of English-speakers and Mandarin-speakers were asked to imagine and recall some life events that

differed in their temporal distance from the present (close vs. distant). They were then asked to complete the same mental imagery scale as the one used in Study 2. The psychological distance felt toward the event and visual perspective used in their mental representation were also assessed.

3.5 Study 3: Temporal Orientation, Culture, and Mental Representation II

3.5.1 Introduction

It has been observed in the present chapter that temporal orientation and mental representation of future and past events are related. This suggests that the phenomenological characteristics of mental representation reflect the psychological distance people feel toward an event in concern, which varies as a function of cultural background.

Study 3 intended to continue this line of investigation by extending the event in question to life events located in different temporal distance from the present (close vs. distant). If psychological distance is an important factor in mental representation, events that are temporally closer (hence psychologically closer) should contain greater phenomenological characteristics compared to those that are temporally more distant (hence psychologically more distant). Therefore, the goal of Study 3 is to replicate and extend the basic findings of study 2, by contrasting the phenomenological characteristics of events that are temporally close (i.e., within one month from present) and relatively more distant (i.e., more than one year from present).

Based on the prediction of CLT, events that are temporally closer are expected to be rated as psychologically closer. Mental representation of more recent events tends to contain greater phenomenological characteristics such as more sensory and contextual information compared to those that are more distant (D'Argembeau & Van der Linde, 2004; Johnson et al., 1988). In order to examine the relationship between perceived psychological distance and the phenomenological characteristics of mental representations associated with different objective temporal distance, participants were asked to imagine (or recall) events that will potentially happen to them (or have happened to them) within one month

from the present and more than one year in the future (or in the past). It was hypothesized that for both English and Mandarin-speakers, events that are relatively closer in objective temporal distance from the present should contain more phenomenological characteristics (i.e., sensory, spatial, temporal) than events that are more distant from the present. In addition, Mandarin-speakers are expected to be more likely to take third-person perspective while imaging and recalling compared to English-speakers.

3.5.2 Method

Participants

Participants' sample size was determined by referring to the article by Fritz and MacKinnon (2007). With a medium effect size expected, power of .80, estimated sample size was 100 in each cultural group. One hundred and six English individuals (56 females) and 111 Chinese individuals (59 females, 1 missing data) participated in this study online. Both English-speakers and Mandarin-speakers were recruited using online survey platform, namely <https://prolific.ac> and www.sojump.com respectively. English-speakers participated in this study in exchange for monetary incentive whereas Mandarin-speakers participated in this study in exchange for a chance to take part in a lucky draw contest.

Participants were asked to imagine and recall events located at specific temporal regions (i.e., within the one month/one year in the past/future), therefore only native English or Mandarin-speakers' responses associated with the correct event dates (fall within the specified temporal regions) were included in the analysis. Screening exercise revealed that 43 English-speakers and 53 Mandarin-speakers provided events associated with dates fall outside of the specified temporal region; 2 English-speakers and 2 Mandarin-speakers gave the same answers to all the self-report questions also did not provide titles for events

they imagined or recalled. These responses were therefore excluded from analysis. As a result, only 61 English-speakers (38 females, $M_{age} = 23.88$, $SD_{age} = 4.48$) and 46 Mandarin-speakers (22 females, $M_{age} = 23.93$, $SD_{age} = 3.53$) were included in the analysis. The majority of the English-speakers were from the U.K. (82%) with the rest from USA (13%), and Canada (5%). All the Mandarin-speakers were from China.

Materials

Participants completed the mental imagery questionnaire identical to that in Study 2 which was adapted and modified from D'Argembeau & Van der Linden (2006). The questionnaire contained 17 questions that were presented in random order. In addition, participants were also asked to provide a brief title and dates of each of the event they imagined/recalled.

Design

This study utilised a 2 Culture (English, Mandarin) x 2 Representation type (Imagination, Memory) x 2 Distance (Close, Distant) mixed-ANOVA design, with culture as a between-participants variable whereas representation type and distance as within-participant variables. Each participant was asked to imagine two events that might reasonably happen to them in the future and to recall two events that happened to them personally in the past. These events differed in their temporal distance from the present: within the next 30 days, within the last 30 days; more than a year ago, more than a year from now. Each participant was randomly allocated to one of the four questionnaire versions which counterbalanced between temporal distance (close and distant) and mental representation type (imagination and memory).

Procedure

Both English and Mandarin-speakers completed this study in their native language respectively. The study procedure was similar to that of Study 2 apart from the events concerned and no mental representation account was provided. All the participants completed the study online. After giving informed consent for their participation, participants provided basic demographic information (e.g. sex, age, first language, country of birth, and country of residence at time of participation) prior to the start of the questionnaire.

Participants were asked to make sure that they pay full attention while completing the study. The use of sound clip was removed because previously some participants commented the sound was too loud. After that they were presented with instructions that were adapted and modified from D'Argembeau and Van der Linden (2004) which explained that the events they imagine or recall should be precise and specific (i.e., they should take place or had taken place in a specific place at a specific time; they should last or have lasted a few minutes or hours but not more than a day). It was also specified that the future events should be things that might reasonably happen to them in the future, given their plans and what they think their future would be. Beneath the instructions, some examples were given to illustrate what would or would not be considered as a specific event:

Example of event that would be considered as specific:

"I'm going to Barcelona for New Year's Eve. I imagine arriving at the hotel and having dinner with my friends in downtown Barcelona"

Example of event that would not be considered as specific:

"I imagine going on vacation in Spain"

They were also informed that the life event should be something they will be personally involved in (or have been personally involved with in the past) and is personally meaningful to them. It was also explained that the event can be positive or negative and about any kind of experience that they think will happen to them (or has happened to them) in the specified time frame. After reading the instructions, the first task was displayed on the computer screen and participants were instructed to close their eyes to spend one minute imagining (or recalling) a possible future life event (or a past life event) in as much detail as possible. After that, they were asked to provide a brief title of the event they have just imagined (or recalled) and a date they think this event might happen in the future (or a date when this event happened). They were asked to provide an exact date if they can if not a date as close to it as possible. They then completed the imagery scale in order to rate the phenomenological characteristics of their imagination (or memory) using the questionnaire identical as the one used in Study 2.

3.5.3 Results

Type of events

For English-speakers, the life events they imagined or recalled fell into a number of categories: festive related (15.98%), leisure activities (10.66%), job or work related (10.25%), the birth of a child/episodes with a child (9.02%), college or university (8.61%), travel (7.79%), illness or death related (7.79%), wedding related (4.92%), romantic episodes (4.92%), party (2.87%), episodes with family (2.87%), shopping (1.23%), and other life events that could not be categorised into these categories (9.43%). For Mandarin-speakers, the life events they imagined or recalled involved leisure activities (16.30%), travel (14.13%), job related (14.13%), college or university related (10.87%), shopping (8.70%), romantic

episodes (5.98%), episodes with family (4.89%), wedding related (4.35%), the birth of a child/episodes with a child (2.17%), illness or death related (1.63%), party (1.63%), festive related (1.09%), and other events that could not be categorised into these categories (9.24%).

Ratings for phenomenological characteristics

Prior to conducting the analysis, for both imagination and memory versions, the ratings for “autonoetic consciousness” were produced by averaging the responses to “feeling of pre-experiencing (or re-experiencing)” and “feeling of traveling forward (or backward) to the event happening time” (Cronbach’s $\alpha_{imag/close} = 0.52$; Cronbach’s $\alpha_{imag/distant} = 0.65$; Cronbach’s $\alpha_{mem/close} = 0.61$; Cronbach’s $\alpha_{mem/distant} = 0.73$); similarly, the ratings of spatial context were produced by averaging responses regarding the “clarity of location”, “clarity of object layout” and “clarity of people layout” (Cronbach’s $\alpha_{imag/close} = 0.55$; Cronbach’s $\alpha_{imag/distant} = 0.74$; Cronbach’s $\alpha_{mem/close} = 0.72$; Cronbach’s $\alpha_{mem/distant} = 0.71$).

Self-report phenomenological characteristics

In order to see if phenomenological ratings differed according to culture, representation type, type of phenomenological characteristic, and temporal distance, a repeated-measure multivariate analysis of variance (MANOVA) was conducted with all the phenomenological ratings (56 measures) as dependent variables, whereas culture as between-participants variable whilst representation type, phenomenological characteristic, and temporal distance as within-participant variables. As illustrated in Table 3.5, using Pillai’s Trace, most of the main effects (all F ’s > 9.698, p ’s < .002) and the interaction effects

(all F 's > 2.637, p 's < .004) reached statistical significance. There was no main effect of culture, $F(101) = 3.283$, $p = .073$, $\eta^2_p = 0.031$, nor was there a culture X distance interaction effect, $F(101) = 1.631$, $p = .204$, $\eta^2_p = 0.016$.

Table 3.5 Results of MANOVA performed for the phenomenological ratings by culture, representation type, type of phenomenological characteristic, and temporal distance for Study 3

	Multivariate Test				
	V	F	Hypothesis df	Error df	η^2_p
Culture		3.28	1	101	.03
Representation	0.09	9.70 **	1	101	.09
Phenomenal	0.69	15.01 ***	13	89	.69
Distance	0.31	44.81 ***	1	101	.31
Culture*Representation	0.05	4.90 *	1	101	.05
Culture*Phenomenal	0.32	3.28 ***	1	89	.32
Culture*Distance	0.02	1.63	1	101	.02
Representation*Phenomenal	0.57	9.04 ***	13	89	.57
Representation*Distance	0.48	93.08 ***	1	101	.48
Phenomenal*Distance	0.61	10.76 ***	13	89	.61
Culture*Representation*Phenomenal	0.35	3.60 ***	13	89	.35
Culture*Representation*Distance	0.10	11.44 ***	1	101	.10
Culture*Phenomenal*Distance	0.28	2.64 **	13	89	.28
Representation*Phenomenal*Distance	0.63	11.65 ***	13	89	.63
Culture*Representation*Distance*Phenomenal	0.33	3.36 ***	13	89	.33

* $p < .05$. ** $p < .01$. *** $p < .001$.

Next, a series of univariate analysis of variance (ANOVA) were conducted for each of the phenomenological characteristic with culture as a between-participants variable, representation type and distance as within-participant variables. The means and standard deviations are presented in Table 3.6 whereas the main effects and interaction effects as a function of culture, mental representation type, and temporal distance are presented in Table 3.7. The result analysis will be broken down and presented in three sections, namely

psychological distance, visual perspective, and all the other phenomenological characteristics.

Table 3.6 Means and standard deviations (in parentheses) for self-report mental representation phenomenological characteristics by culture, representation type, and temporal distance for Study 3.

	English (n = 61)				Mandarin (n = 46)			
	Imagination		Memory		Imagination		Memory	
	Close	Distant	Close	Distant	Close	Distant	Close	Distant
Psychological distance	3.18 (1.97) _a	5.10 (1.82) _b	2.61 (1.81) _a	4.43 (1.94) _c	3.46 (1.83) _a	4.09 (1.55) _b	3.30 (1.67) _a	3.87 (1.71) _a
Visual perspective	3.97 (2.56)	4.48 (2.34)	3.59 (2.59)	3.57 (2.54)	5.09 (1.52)	5.13 (1.50)	5.02 (1.42)	5.15 (1.35)
Autonoetic consciousness	5.08 (1.54)	4.73 (1.49)	5.25 (1.53)	4.90 (1.58)	5.01 (0.95)	5.05 (1.09)	5.39 (0.92)	5.27 (1.00)
Visual details	5.56 (1.42)	5.33 (1.60)	6.18 (0.89)	6.21 (1.20)	4.67 (1.17)	4.83 (1.69)	5.39 (1.16)	5.33 (1.10)
Sounds	4.25 (2.29) _a	3.73 (2.10) _a	4.83 (2.17) _b	4.73 (2.18) _b	4.93 (1.32)	4.72 (1.56)	4.89 (1.59)	4.85 (1.59)
Smells/tastes	3.13 (2.17)	2.51 (2.09)	3.15 (2.23)	2.92 (2.00)	4.26 (1.99)	3.87 (1.81)	4.02 (1.94)	3.83 (1.68)
Spatial context	5.08 (1.21) _a	4.49 (1.53) _c	6.19 (1.00) _b	5.82 (1.17) _d	4.84 (0.99) _a	4.63 (1.21) _a	5.30 (0.93) _b	5.11 (0.87) _b
Temporal information	5.51 (1.74) _a	4.43 (1.94) _b	6.05 (1.43) _c	6.05 (1.41) _c	5.11 (1.45) _a	4.57 (1.50) _a	5.72 (1.17) _b	5.41 (1.34) _b
Feeling emotions	5.23 (1.66)	4.93 (1.64)	5.15 (1.67)	5.56 (1.53)	5.35 (1.14)	5.26 (1.14)	5.30 (1.21)	5.13 (1.29)
Emotions intensity	4.90 (1.51) _a	5.72 (1.45) _b	4.89 (1.83) _a	5.89 (1.46) _b	5.22 (1.28)	5.24 (1.34)	5.17 (1.32)	5.43 (1.34)
Emotions valence	5.45 (1.82)	5.77 (1.64)	4.64 (2.26)	5.03 (2.33)	5.43 (1.36)	5.54 (1.35)	4.98 (1.54)	5.15 (1.63)
Personal importance	5.13 (1.62) _a	6.02 (1.44) _b	4.75 (1.79) _a	6.13 (1.40) _b	5.13 (1.09)	5.59 (1.17)	5.15 (1.46)	5.46 (1.09)
In words	3.69 (2.08)	3.28 (1.97)	3.78 (2.26)	3.59 (2.16)	4.37 (1.37)	4.54 (1.35)	4.50 (1.35)	4.54 (1.60)
Coherent story	4.07 (1.94) _a	3.77 (2.12) _a	5.00 (1.91) _b	5.30 (1.87) _b	4.70 (1.59)	4.80 (1.42)	5.20 (1.26)	5.22 (1.38)

Note: Values for autonoetic consciousness and spatial context refer to mean average. Rating scales: psychological distance: 1 = very close; 7 = very far away; visual perspective: 1 = entirely looking through my eyes; 7 = I can see myself in the imagination/memory; autonoetic consciousness: 1 = not at all; 7 = completely; visual/sounds/smells/tastes sensory details: 1 = none; 7 = a lot; spatial context: 1 = not at all clear; 7 = very clear; feeling emotions: 1 = not at all; 7 = completely; emotion intensity: 1 = not intense; 7 = very intense; emotion valence: 1 = very negative; 7 = very positive; personal importance: 1 = not at all important; 7 = very important; in words: 1 = not at all; 7 = a lot; coherent story: 1 = not at all; 7 = completely.

Means not sharing a common subscript (a, b, c, d) are not statistically different at $p < .05$.

** $p < .05$. ** $p < .01$. *** $p < .001$.*

Table 3.7 Main and interaction effects for self-report of mental representation phenomenological characteristics by culture, representation type, and temporal distance for Study 3.

	Main effects						Interaction effects							
	Eng vs Man		Ima vs Mem		Clo vs Dist		Imag/Mem* Culture		Clo/Dist* Culture		Imag/Mem* Clo/Dist		Imag/Mem* Clo/Dist*Culture	
	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p
Psychological distance	0.41	.00	5.64 *	.05	55.07 ***	.34	1.55	.02	14.62 ***	.12	0.12	.00	0.01	.00
Visual Perspective	15.14 ***	.13	3.35	.03	1.30	.01	2.93	.03	0.30	.00	0.51	.01	1.00	.01
Autonoetic consciousness	1.16	.01	4.88 *	.04	2.71	.03	0.38	.00	1.75	.02	0.14	.00	0.17	.00
Visual details	22.13 ***	.17	32.31 ***	.24	0.06	.00	0.37	.00	0.37	.00	0.01	.00	1.37	.01
Sounds	3.45	.03	6.51 *	.06	1.68	.02	5.23 *	.05	0.28	.00	0.85	.01	0.14	.00
Smells/tastes	13.82 ***	.12	0.06	.00	4.89 *	.04	1.45	.01	0.17	.00	0.89	.01	0.10	.00
Spatial context	7.79 **	.07	61.73 ***	.37	13.73 ***	.12	12.32 **	.11	2.36	.02	0.49	.01	0.34	.00
Temporal information	2.53	.02	37.45 ***	.26	13.45 ***	.11	1.43	.01	0.20	.00	8.27 **	.07	3.37	.03
Feeling emotions	0.09	.00	0.68	.01	0.16	.00	2.52	.02	0.34	.00	1.53	.02	2.50	.02
Emotions intensity	0.21	.00	0.32	.00	15.09 ***	.13	0.00	.00	8.07 **	.07	0.77	.01	0.02	.00
Emotions valence	0.10	.00	14.90 ***	.13	1.87	.02	1.28	.01	0.35	.00	0.08	.00	0.01	.00
Personal importance	1.35	.01	0.49	.01	22.63 ***	.18	0.08	.00	5.58 *	.05	0.62	.01	2.23	.02
In words	9.91 **	.09	0.99	.01	0.39	.00	0.29	.00	2.20	.02	0.02	.00	0.46	.00
Coherent story	4.22 *	.04	22.38 ***	.18	0.05	.00	4.71 *	.04	0.05	.00	1.05	.01	1.90	.02

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

Psychological distance

Memory was rated as psychologically closer than imagination for all event types, $F(105) = 5.640, p = .019, \eta^2_p = 0.051$. In addition, temporally closer events were rated as psychologically closer than temporally distant events, $F(105) = 55.065, p < .001, \eta^2_p = 0.344$. This effect was moderated by culture, $F(105) = 14.620, p < .001, \eta^2_p = 0.122$. Post hoc tests (Bonferroni correction $\alpha = .025$) revealed that this effect was stronger for English-speakers, $F(105) = 73.523, p < .001, \eta^2_p = 0.412$ than Mandarin-speakers, $F(105) = 5.674, p = .019, \eta^2_p = 0.051$.

Visual perspective¹³

For visual perspective adopted while imagining and recalling the events, Mandarin-speakers reported being more likely to adopt third-person perspective compared to English-speakers, $F(1, 105) = 15.141, p < .001, \eta^2_p = .126$.

Other phenomenological characteristics

English-speakers reported greater visual details [$F(1, 105) = 22.130, p < .001, \eta^2_p = .174$] and greater spatial context clarity [$F(1, 105) = 7.785, p = .006, \eta^2_p = .069$] than Mandarin-speakers. In contrast, Mandarin-speakers reported greater smells/tastes details [$F(1, 105) = 13.823, p < .001, \eta^2_p = .116$] than English-speakers. In addition, Mandarin-speakers' also rated their mental representations as more likely to be formulated in words [$F(1, 104) = 9.914, p = .002, \eta^2_p = .087$] and more coherent [$F(1, 105) = 4.218, p = .042, \eta^2_p = .039$] compared to English-speakers.

¹³ A repeated-measure ANOVA with culture and gender as between-participants variables whereas distance and representation type as within-participant variables revealed no significant main effect or interaction effect of gender on the use of visual perspective (all F 's $< 1.424, p$'s $> .235$).

For both temporal distances, memory was being rated as containing greater amount of auto-noetic consciousness [$F(1, 105) = 4.880, p = .029, \eta^2_p = .044$], visual details [$F(1, 105) = 32.312, p < .001, \eta^2_p = .235$], sound related details [$F(1, 104) = 6.511, p = .012, \eta^2_p = .059$], higher spatial context clarity [$F(1, 105) = 61.725, p < .001, \eta^2_p = .370$], temporal information [$F(1, 105) = 37.449, p < .001, \eta^2_p = .263$], and more coherent [$F(1, 105) = 22.384, p < .001, \eta^2_p = .176$] than imagination. Conversely, imagination was being rated as emotionally more positive than memory for both temporal distances [$F(104) = 14.902, p < .001, \eta^2_p = 0.125$].

For both representation types, closer events were being rated as containing greater smells/tastes sensory details [$F(1, 105) = 4.889, p = .029, \eta^2_p = .044$], greater spatial context clarity, $F(1, 105) = 13.732, p < .001, \eta^2_p = .116$, and more temporal information [$F(1, 105) = 13.448, p < .001, \eta^2_p = .114$] than more distant events. Conversely, more distant events were being rated as more emotionally intensified [$F(105) = 15.092, p < .001, \eta^2_p = 0.126$] and as more personally important [$F(1, 105) = 22.628, p < .001, \eta^2_p = .177$] than closer events.

There was a culture X representation type interaction for sound sensory details [$F(1, 104) = 5.226, p = .024, \eta^2_p = .048$] and spatial context [$F(1, 105) = 12.320, p = .001, \eta^2_p = .105$]. Post-hoc tests using the Bonferroni correction ($\alpha = .025$) revealed that English-speakers rated their memory as containing more sound sensory details [$F(1, 104) = 13.483, p < .001, \eta^2_p = .115$] and greater spatial clarity [$F(1, 105) = 75.131, p < .001, \eta^2_p = .417$] than imagination. However, Mandarin-speakers rated their memory as containing greater spatial clarity [$F(1, 105) = 8.285, p = .005, \eta^2_p = .073$] than imagination whereas there was no difference in their ratings of sound sensory details [$F(1, 104) = 0.031, p = .860, \eta^2_p < .001$].

There was also a culture x distance interaction effect for emotional intensity [$F(105) = 8.068, p = .005, \eta^2_p = 0.071$] and personal importance [$F(1, 105) = 5.581, p = .020, \eta^2_p = .050$] ratings. Post-hoc tests using the Bonferroni correction ($\alpha = .025$) revealed that

English-speakers rated distant events as more emotionally intensified [$F(105) = 26.302, p < .001, \eta^2_p = .200$] and as more personally important [$F(1, 105) = 29.474, p < .001, \eta^2_p = .219$] than closer events. However, this difference was absent for Mandarin-speakers [emotional intensity: $F(105) = 0.478, p = .491, \eta^2_p = 0.005$; personal importance: $F(1, 105) = 2.514, p = .116, \eta^2_p = .023$].

There was a representation type X temporal distance interaction for temporal information [$F(1, 105) = 8.272, p = .005, \eta^2_p = .073$] with post-hoc tests (Bonferroni correction $\alpha = .025$) revealing that the temporal distance effect was stronger for memory [$F(1, 105) = 45.895, p < .001, \eta^2_p = .304$] than imagination [$F(1, 105) = 8.962, p = .003, \eta^2_p = .079$].

3.5.4 Discussion of Study 3

It was expected that if psychological distance influences mental representation, comparing mental representation of events located at different temporal regions will inform us on how psychological distance, temporal distance, and mental representations are related.

The results showed that temporally closer events were also rated as psychologically closer compared to temporally more distant events. This applies to both future life events and past personal occurrences for both English and Mandarin-speakers. In other words, both cultural groups rated events that will happen/have happened within one month from the present as psychologically closer than events that will happen/have happened more than one year from now.

Consistent with predictions, the MANOVA showed that the effect of temporal distance on ratings of phenomenological characteristics were not moderated by culture.

Both English and Mandarin-speakers rated temporally closer event as psychologically closer (vs. temporally more distant event) and as containing greater phenomenological characteristics including greater sensory details (e.g., smell/tastes), spatial details, and temporal information.

Memory was rated as psychologically closer than imagination, for both closer and more distant events. Consistent with the psychological distance ratings, memory representations were reported to be more vivid, namely they contained greater autonoetic consciousness, visual details, sensory details of sound, spatial details, temporal information, and appeared to be more coherent than imagination. This observation is consistent with previous findings that memory typically consists of more contextual and sensory details compared to imagination (D'Argembeau & Van der Linde, 2004; Johnson et al., 1988) and even fabricated memories (Justice, et al. 2013). This is presumably due to memory being associated with the past which is more confined to reality whereas imagination of possible future events tends to be less reality-restricted and more goal-directed. A related observation is the emotional valence ratings which shows that participants rated their imagination as emotionally more positive than their memory. This indicates that participants anticipated their future to be largely positive which resonates with the optimistic tendency people generally have toward future life events (Weinstein, 1980).

The observation of distant events (past and future) being rated as emotionally more intense and more personally important compared to close events suggests that when asked to bring to mind a life event, people tend to imagine or recall more salient events that are likely to have a major impact on their life. A possible explanation for this is that emotionally more intense and personally more important events are likely to be more memorable (e.g.,

being rehearsed as a past event more often) and subjected to simulation as a potential future event more often.

Overall, Mandarin-speakers reported greater use of third-person perspective (vs. English-speakers) when they imagine or recall life events. This applies to both imagination and memory and for both close and distant events. This finding is consistent with the results in Study 2 in this thesis and also previous research (Cohen & Gunz, 2002).

The overall ratings of phenomenological characteristics in respect to close events in this study share some similarities as well as differences with the findings in Study 2. In terms of similarities, events were rated as emotionally more positive during imagination (vs. memory) in both studies. In addition, English-speakers tended to rate their mental representations as containing greater visual and greater spatial context clarity whereas Mandarin-speakers were more likely to rate their mental representations as being formulated in words.

There are also some differences between the findings of Study 2 and Study 3. For instance, whilst Mandarin-speakers rated their mental representations to contain greater sensory details related to sound and smells/tastes than English-speakers in Study 2, this difference was absent in this study. Conversely, although Mandarin-speakers rated themselves to experience more emotional feelings and more intense emotional responses than English-speakers in Study 2, this was not the case in this study. In relation to close events psychological distance ratings in Study 3, there was no difference in Mandarin-speakers' prospective and retrospective ratings. The same was observed for English-

speakers¹⁴. Although the observation of English-speakers' psychological distance ratings in Study 3 appeared to be inconsistent with the outcome of Study 2, however, due to use of different research paradigms between the two studies, it is difficult to conclude whether these differences were due to the difference of the nature of events being imagined/recalled or due to participants' own predispositions.

The reliability of the questions of the autonoetic consciousness phenomenological characteristic was assessed with the Cronbach's alpha level for "feeling of pre-experiencing (or re-experiencing)" and "feeling of traveling forward (or backward) to the event happening time". The Cronbach's alpha for close imagination (0.52), distant imagination (0.65), and close memory (0.61) appeared to be lower than that of distant memory (0.73). A low Cronbach's alpha might be an indication of low internal consistency (Cronbach, 1951). However, other factors could also result in a low alpha value including a small number of items and items with poor inter-relatedness (Tavakol & Dennick, 2011). Further analyses revealed that the items have good inter-correlations¹⁵. Moreover, separate analyses conducted for each of the item showed that the results did not change the current conclusion¹⁶.

In conclusion, the results in this study confirmed that phenomenological characteristics of mental representations vary as a function of objective temporal distance and subjective psychological distance towards the event in question. The results in this study also converged with that of Study 2, showing that psychological distance is an

¹⁴ A separate paired sample t-test for English and Mandarin-speakers revealed no significant difference between their prospective and retrospective psychological distance ratings [English-speakers: $t(60) = 1.994$, $p = .051$; Mandarin-speakers: $t(45) = 0.607$, $p = .547$].

¹⁵ all r 's $> .352$, p 's $< .001$

¹⁶ Participants' scores on the 'feeling of pre-experience (or re-experience)' and 'feeling of traveling forward (or backward)' were entered into a separate repeated-measure ANOVA with culture as a between-participants factor. The sole significant effect was a main effect of representation type on feeling of traveling, $F(1, 105) = 5.490$, $p = .021$, $\eta^2_p = .050$. No other significant effect emerged (all F 's < 3.121 , p 's $> .008$).

important variable that influences mental representations as both English- and Mandarin-speakers' mental representations have been found differ in accordance to the psychological distance (and also objective distance) of the event in concern.

The next study intended to examine the relationship between culture and temporal orientation by using a different temporal orientation measure – specifically, by using nostalgia as an indication of past orientation. An individual's nostalgic tendency is the extent to which he/she thinks about the past which is essentially a characteristic of past orientation as it refers to people's tendency to be cognitively involved in the past (i.e., a particular temporal region) (Park et al., 2007). Study 4 also aims to explore whether mental representation will influence other cognitive processing, namely, our valuation judgment of nostalgic items.

3.6 Study 4: Temporal Orientation, Culture, and Value Judgment

3.6.1 Introduction

It has been found that the phenomenological characteristics of mental representation vary as a function of objective distance (hence psychological distance), culture, and temporal region. Following the observation that temporal orientation could exert influence on one's judgment of value (Caruso et al., 2008; Guo et al., 2012), the present study intends to examine whether an individual's tendency to be temporally oriented towards the past will affect their mental representation of nostalgic items, which in turn influences their valuation of these items. In this study, the implications of past-orientation for general feelings of attachment to the past (i.e., nostalgia) as well as value judgment of items associated with the past were examined.

A tendency to temporally orient towards the past implies that an individual might think more or focus more on the past, which is one of the central features of nostalgia (i.e. thinking, remembering, longing, experience feeling about the past; Hepper et al., 2014). Therefore, it is possible that the more chronically accessible the past is, the more likely it will influence past-related judgments - in this case, valuations of nostalgic items.

There is ample observation in the literature demonstrating that mental representations formed in regard to an object, person, or event can influence people's subsequent judgment. For instance, the more recently a memory is formed or the more frequently we access a memory, the more likely it is to be used to make a related judgment (see reviews Wyer, 2007). For events or objects that are not presently available, psychological distance was found to affect people's evaluation of objects, perhaps through the mental construal people form (Trope, Liberman, & Wakslak, 2007). For example, when evaluating a consumer product, the psychological distance people feel toward the product

could direct their attention to focus on certain aspects (e.g., the primary/central vs. secondary/peripheral features) which in turn affects their product evaluation (Kim, Zhang, & Li, 2008).

If mental representation and emotions could exert influence on people's evaluation or judgement, it is possible that greater feeling of nostalgia might trigger stronger emotion hence resulting in greater valuation judgments being placed on sentimental items. This study is designed based on this assumption, in order to investigate the relationship between temporal orientation and value judgement by using the endowment effect paradigm.

The feeling of nostalgia is primarily related to the past, as hope is related to the future. It is defined as a sentimental longing or wistful affection for the past (New Oxford Dictionary of English, 1998, p. 1266). Nostalgia is a universal phenomenon and people around the world share similar understanding of it (Hepper et al., 2014). Albeit debates exist on the nature and valence of its affective dimension (e.g., whether it is positive, negative, or ambivalent in nature), feelings of nostalgia consist of and give rise to more positive than negative emotions (Wildschut, Sedikides, Arndt, & Routledge, 2006). It is an emotion associated with various past oriented feelings such as remembering, reminiscence, longing, dwelling, missing, or even want to return to those personally meaningful and important past experiences (Hepper et al., 2012).

Whilst previous research has established that diverse cultures share a common conceptual understanding of nostalgia (Hepper et al., 2014), it has not yet determined whether members of different cultures differ in the magnitude of their nostalgic experiences. Thus, in the present study, the aims are to examine whether: 1) members of East Asian cultures (which are claimed to be more past-oriented) would exhibit greater levels of nostalgia than Westerners (who are more future-oriented), and 2) whether this

tendency to focus more on the past would be evident in their valuation judgment about nostalgic items. As suggested by earlier work (Guo et al., 2012), perception of the past as psychologically closer may also have repercussions for the value placed on events and items associated with the past. Valuing the past and the objects associated may be manifested in various ways. For example, individuals who place greater value on the past may be more likely to experience nostalgia. This might have implication on their attachment to nostalgic items which in turn results in varied valuation judgment.

As previously discussed, East Asians attend to and value the past to a greater extent than Westerners (Guo et al., 2012; Ji et al., 2009). Although nostalgia is a universal phenomenon (Hepper et al., 2014), these cultural differences suggest that the experience of nostalgia may vary cross-culturally as well. It is thus predicted that East Asians who have been found to be more past oriented (e.g., Guo et al., 2012) might exhibit greater nostalgia tendency hence value nostalgic items more compared to Western individuals.

One of the widely studied and robust phenomenon where an object's value increases by virtue of ownership is termed endowment effect (Thaler, 1980). It is commonly exhibited using either the exchange paradigm (i.e. research participants are endowed with an object and later given a chance to exchange it; Knetsch, 1989) or the valuation paradigm (i.e. research participants are assigned to be a buyer or seller, and are asked to provide a price at which they would be willing to buy/sell an object; Kahneman, Knetsch, & Thaler, 1990). In the exchange paradigm, the endowment effect is evidenced by participants' reluctance to exchange the endowed object for a new object. Likewise, in the valuation paradigm, the endowment effect is measured by the (positive) difference between seller's willingness-to-accept price (WTA) and buyer's willingness-to-pay price (WTP) for the same object.

The endowment effect is often explained in terms of loss aversion (Kahneman & Tversky, 1979) – that is, the pain associated with losing an object is greater than the pleasure associated with acquiring one. However, other factors also affect the strength of the endowment effect, such as duration of ownership (Strahilevitz & Loewenstein, 1998); attentional focus (Ashby, Dickert, & Glöckner, 2012); social context in which the endowed object is used (Gobel, Ong, & Harris, 2014); subjective feelings of ownership (Reb & Connolly, 2007); and cultural backgrounds (Maddux et al., 2010).

For example, Maddux and his colleagues (2010; cf Gobel et al, 2014) investigated the endowment effect using a valuation paradigm, and found that European Canadians exhibited a stronger endowment effect for recently-acquired objects compared to East Asian participants. They attributed their findings to differences in self-construals. Specifically, European Canadians (who display primarily independent self-construals) show greater self-enhancement compared to Japanese participants (who have primarily interdependent self-construals). Maddux et al suggested that individuals who are prone to self-enhancement (i.e., Westerners) are likely to assign greater value on objects associated with the self, thus demonstrating a greater endowment effect.

Although the present study was designed with the association of nostalgia and valuation in mind, other research findings offer insight on the understanding of why and how people assign greater value to personal possessions suggest that an item's intrinsic value can be influenced by its own characteristics or the value people attach or associate the item with. For example, not only that an item's intrinsic value is influenced by the prospect of actual functional usage, it is also influenced by the perceived financial value and the psychological meanings it has (e.g., its association with significant others - Wallendorf & Arnould, 1988; as a connection to the personal past - Belk, 1988). These factors affect the

monetary valuation people place on possessions or previous possessions and also their motivation of keeping them.

In terms of cross-cultural comparisons, the personal meanings people assign and attach to personal items have been found to vary across cultures (Wallendorf & Arnould, 1988). For example, Americans' attachment to their favourite possessions was found to be largely based on the possession's connection to the owner's personal past (e.g., as a reminder of an important person or a personally important past event). Personal items were thought to be a reflection of our personal identity and value. For instance, the items we own can be used to convey and express ourselves (Belk, 1988). Thus, the connection between personal possession and owner should be a more important aspect for Western individuals, as Western societies cherish and celebrate personal value and uniqueness to a greater extent than East Asian societies. Following this line of reasoning, it is possible that Western individuals should attribute greater values to nostalgic items - a suggestion that is consistent with the greater endowment effect observed among Western individuals (Maddux et al., 2010). This will serve as a competing hypothesis of the present study.

In summary, this study extended the investigation on the relationship between culture and temporal orientation to include its potential downstream effects, namely, nostalgic item valuations. Nostalgia tendency was used as an alternative measure of temporal orientation. Participants were asked to complete the Southampton Nostalgia Scale (SNS; Barrett, et al., 2010) which consists of seven items that assess people's past-oriented tendency. The scale is a multifaceted measure of nostalgic tendency which assesses the frequency of experiencing nostalgic tendency, personal relevance of nostalgia, and the proclivity of experiencing nostalgia episodes.

It is worth clarifying that it is difficult to pinpoint the exact definition of being more “past oriented” because previous studies conducted in relation to stronger past orientation among East Asians included a wide variety of observations (e.g., feel closer to a past event/time point – Ji et al., 2009; value past event or object more – Guo et al., 2012; attend to a wider range of past information – Ji et al., 2009). Therefore, in this thesis, greater past orientation is expected to be associated with general greater nostalgic tendency. Nostalgic tendency includes thinking more about the past, perceiving nostalgia to be more personally relevant and the self to be more prone to nostalgia experience as measured by the SNS measure (Barrett, et al., 2010).

The nostalgic object valuation judgement will be investigated by adapting and modifying the valuation paradigm used to investigate the endowment effect. In the conventional research paradigm to investigate endowment effect, individuals who are endowed with an object (i.e., sellers) typically demand more money to part with the object than those who are willing to pay to acquire it (i.e., buyers). In this study, Mandarin and English-speakers were asked to assume the role of buyer or seller of a sentimental object and then give a monetary value they were willing to pay (or accept) to acquire (or part with) the object. The feelings of nostalgia were triggered by asking participants to imagine being presented with a series of previously owned objects. Participants were subsequently asked to assign a value to each of the objects. Buyers imagined themselves having owned these nostalgic objects previously but no longer currently owning them whereas sellers imagined themselves currently owning these objects but no longer needing them.

The above considerations lead to a number of predictions regarding the relationship between culture, nostalgic tendency, and valuation judgment. In terms of nostalgia tendency, it is suspected that East Asian individuals who are claimed to be more past

oriented (Ji et al., 2009) should exhibit greater nostalgia tendency by scoring higher on the SNS compared to Western individuals who are more future oriented (Caruso et al., 2008).

There are two competing hypotheses in relation to the outcome of nostalgic object valuation. Firstly, to the extent that greater attachment to the past (and its associated objects) derives from greater past-orientation, it is expected that not only Mandarin-speakers should display stronger nostalgia tendency, they should also assign higher values to nostalgic objects (vs. English-speakers) following their imagination of owning them previously. This is because Mandarin-speakers who are claimed to be past-oriented should display greater nostalgia tendency and experience stronger emotions while imagining owning nostalgic objects which in turn resulted in higher monetary valuation being assigned to these objects compared to English-speakers.

On the other hand, in light of a stronger association between the self and personal possession among Western individuals (Wallendorf & Arnould, 1988), it might be predicted that imagining previous ownership of those sentimental objects should result in stronger emotions felt which in turn would lead Western individuals to assign greater values to previously owned sentimental personal objects compared to Mandarin-speakers.

It is worth clarifying that although this study adapted and modified the conventional experimental procedure to investigate the endowment effect (Kahneman et al., 1990), the difference between buying and selling valuations is not the primary interest of this study. In the conventional endowment effect paradigm, participants who are allocated the buyer roles have never taken ownership of the object but are asked to value whilst sellers typically assume a brief ownership of the object in concern. However, in this study, buyers were asked to assume that they had owned the objects in the past, but that they no longer owned them. In contrast, sellers were asked to assume that they currently owned the

objects, but no longer needed them. As past work observed that previous ownership experience and the duration of ownership can affect valuation judgments (Strahilevitz & Loewenstein, 1998), it is unclear how the shifting in buyer and seller's reference point will affect their valuation. Moreover, the main interest of the present study is the relationship between nostalgia tendency and valuation. Therefore, no specific hypothesis will be made regarding the endowment effect in the present study.

3.6.2 Method

Participants

Two hundred and sixty-six participants participated in this study by completing an online questionnaire. Participants were recruited by posting study links on various psychological and non-psychological research websites and social-networking platforms (see Appendix A – Part I for online recruitment sources). These included 184 English-speakers and 82 Mandarin-speakers. Participants were recruited by offering a chance to win a prize lucky draw (£20 cash voucher each for English-speakers and Mandarin-speakers respectively) for completing the questionnaire online.

Of the two hundred and sixty-six responses, 225 were valid following the screening process following the inclusion criteria (exclusion rate = 15.41%) (32 responses were incomplete, 9 were non-native English-speakers). There were 148 English-speakers and 77 Mandarin-speakers (154 females, 1 did not report gender, ages 18-74, median age group 25-34). For the English-speakers, majority of them were born in the U.K. (50.0%) and the U.S.A (38.5%). The rest of them were born in Canada, Australia, and New Zealand. For the Mandarin-speakers, majority of them were born in Malaysia (75.3%) and China (14.3%). The rest of them were born in Taiwan, Hong Kong, and Singapore.

Design and Procedure

Participants completed the Southampton Nostalgia Scale (SNS; Barrett, et al., 2010), consisting of seven items that assess three aspects of nostalgia including the frequency of experience nostalgic episodes (*'How often do you experience nostalgia?', 'Generally speaking, how often do you bring to mind nostalgic experiences?', 'Specifically, how often do you bring to mind nostalgic experiences?'*), the personal relevance of nostalgia experience (*'How important is it for you to bring to mind nostalgic experiences?', 'How valuable is nostalgia for you?', 'How significant is it for you to feel nostalgic?'*), and the proclivity to nostalgia (*'How prone are you to feeling nostalgic?'*). Participants rated these questions on a 7-point scale (1 = *not at all/very rarely*; 7 = *very much/very frequently*) which were presented in a randomised order. The SNS had a high level of internal consistency (Cronbach's $\alpha = .93$). Previous cross-cultural studies conducted in relation to a stronger past orientation included a variety of observations (e.g., feel closer to a past event/time point – Ji et al., 2009; value past event or object more – Guo et al., 2012; and attend to a wider range of past information – Ji et al., 2009), therefore a greater past orientation among Mandarin-speakers is expected to be associated with a general greater nostalgic tendency and therefore the SNS scale will not be broken down into its subscales.

They were then assigned to one of two between-participants conditions, which determined which version of a valuation questionnaire they received. Participants in both conditions were asked to report the value they assigned to seven hypothetical items (in randomised order) that had sentimental value (for all the hypothetical item scenarios refer to Appendix C). Approximately half of the participants were asked to assume the role of a 'seller' and the other half were asked to assume the role of a 'buyer' of those items. For example, participants assigned to the 'buyer' role responded to the item:

Imagine you are buying a t-shirt. You see a t-shirt for sale that is from a concert of your favourite band that you went to years ago. You have good memories from that night and wished you had bought a t-shirt at the time. Choose a price you would pay for the t-shirt now (from £0 to £10). Give the amount to the nearest 50 pence.

On the other hand, participants who were assigned the role of ‘seller’ were asked to respond to the item:

Imagine you are selling a t-shirt that you got when you saw your favourite band in concert. The t-shirt brings back good memories; however, it no longer fits you and you wish to sell it so that someone else may enjoy it. Choose a price you would sell the t-shirt for (from £0 to £10). Give the amount to the nearest 50 pence.

3.6.3 Results

Nostalgia

A nostalgia index (SNS index) was generated by averaging across all seven items. The SNS index was analysed using an independent sample t-test. Mandarin-speakers produced higher SNS index than English-speakers, $t(223) = 2.26, p = .025, d = .32$. See Table 3.8 for descriptive statistics and the t-test outcome.

Table 3.8 Means, standard deviations, and the t-test outcome by SNS and culture for Study 4.

	English ($n = 148$)		Mandarin ($n = 77$)		t-test	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>d</i>
SNS index	4.42	1.38	4.85	1.29	2.26 *	.32

* $p < .05$. ** $p < .01$. *** $p < .001$.

Valuation Judgment

Participants' valuations of the seven items were internally consistent¹⁷ (Cronbach's $\alpha = .79$ for participants in the 'seller' role and $\alpha = .78$ for those in the 'buyer' role). They were therefore averaged before analysis. The means and standard deviations are presented in Table 3.9. A 2 Culture (English, Mandarin) x 2 Role (Seller, Buyer) ANOVA was conducted for the valuation of the nostalgic items. ANOVA yielded no significant effects on culture [$F(1, 173) = 1.059, p = .305, \eta_p^2 = .006$], role [$F(1, 173) = 0.803, p = .371, \eta_p^2 = .005$], nor was there a culture x role interaction [$F(1, 173) = 0.822, p = .366, \eta_p^2 = .005$].

Table 3.9 Means and standard deviations for nostalgic item valuation by role type and culture for Study 4.

	English ($n = 116$)		Mandarin ($n = 61$)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Seller	5.55	1.98	6.18	2.19
Buyer	6.14	2.08	6.17	1.99

Note: Higher numbers indicate greater valuations. The valuations were mean averages.

Relationships among Measures

There was a positive correlation between SNS scores and valuations, $r(177) = .295, p < .001$. In separate analyses, the correlation between SNS scores and valuations was reliable for English-speakers [$r(116) = .431, p < .001$], absent for Mandarin-speakers [$r(61) = -.014, p = .917$] and of similar magnitude for sellers [$r(96) = .236, p = .021$] and for buyers [$r(81) = .374, p = .001$]. English-speakers in the both seller and buyer roles had a higher SNS and

¹⁷ The valuations provided by participants were also internally consistent within their own cultural group (English-speakers: Cronbach's $\alpha_{buyer} = .77$, Cronbach's $\alpha_{seller} = .73$; Mandarin-speakers: Cronbach's $\alpha_{buyer} = .81$, Cronbach's $\alpha_{seller} = .80$).

valuations correlation compared to those of Mandarin-speakers'. See Table 3.10 for correlations.

Table 3.10 *Correlation of SNS scores and valuations for English and Mandarin-speakers by role for Study 4.*

	Pearson's Correlation
Overall (<i>N</i> = 177)	0.30 ***
English (<i>n</i> = 116)	0.43 ***
<i>Seller</i> (<i>n</i> = 66)	0.39 **
<i>Buyer</i> (<i>n</i> = 50)	0.52 ***
Mandarin (<i>n</i> = 61)	-0.01
<i>Seller</i> (<i>n</i> = 30)	-0.14
<i>Buyer</i> (<i>n</i> = 31)	0.12

* $p < .05$. ** $p < .01$. *** $p < .001$.

3.6.4 Discussion of Study 4

In Study 4, I tested the proposition that cultural effects would manifest in temporal orientation that individuals attend to - specifically, that Mandarin-speakers would display higher nostalgia tendency compared to English-speakers because they are relatively more past-oriented. Consistent with this hypothesis, the average mean SNS scores of Mandarin-speakers were higher compared to English-speakers.

In addition, cross-cultural differences in monetary valuation on nostalgic items was examined. Two hypotheses related to this were identified. The first hypothesis was established based on the assumption that nostalgic tendency should be related to temporal disposition, which in turn, should affect one's item valuation. Following this line of reasoning, Mandarin-speakers who are more past-oriented should score higher on the SNS and also assign greater monetary valuation to nostalgic items compared to English-speakers. In contrast, the second hypothesis was formulated due to the perceived stronger ties

between personal possession and the self among Western individuals. Based on this, English-speakers should place higher values on nostalgic items because of their higher perceived intrinsic values of these items compared to Mandarin-speakers.

The results showed that there was no difference in valuation judgments between English and Mandarin-speakers. For Mandarin-speakers, the value placed on these nostalgic items was not related to their level of nostalgia. In contrast, there was a strong positive correlation between value and nostalgia among English-speakers. This suggest that there is a stronger correspondence between nostalgia and valuation among English-speakers, whereas this correspondence was virtually non-existent among Mandarin-speakers.

The stronger correspondence between valuation and nostalgia tendency among English-speakers appears to be consistent with the second hypothesis. As discussed earlier in this chapter, one of the culturally-related factors identified to influence valuation of personal possession is the perceived attachment between the item and the owner, for instance, a perceived connection of an item with one's personal past (Wallendorf & Arnould, 1988). This would explain the stronger association found between nostalgia tendency and nostalgic item valuations among English-speakers in this study as the nostalgic items were described to be connected to one's personal past.

On the other hand, the weaker correspondence between valuation and nostalgia tendency among Mandarin-speakers indicates that their valuation of nostalgic items is likely based on other consideration rather than the items' perceived intrinsic values for being associated with the past.

The observation of a different association between nostalgia tendency and nostalgic item valuation between English and Mandarin-speakers suggest that more investigation is needed to clarify this, namely what kind of attachment is likely to exert more influence on

their valuation judgment. For example, whether it is based on attached personal values, reminder of a past event, the functional or utility value of the item, or the perceived financial value of the item. Taken together the existing literature and the findings of Study 4, it appears that there is a variation between cultures in terms of the nature of attachment form between individual and item and the extent to which this would affect their valuation judgment.

This study is designed to examine the influence of mental representation on judgment/decision. It is possible that the value one places on a nostalgic item may be related to the strength of nostalgic feeling evoked by thinking about the past, which should be associated with the imagination vividness and clarity of owning these items. However, participants' imagination or emotions felt in the nostalgic scenarios were not measured in this study therefore it is unclear whether the intensity of nostalgic feeling associated with their imagination was sufficient to exert influence on their nostalgic items' valuation. Nevertheless, previous studies found that simply asking participants to imagine owning an object was sufficient to evoke a sense of ownership and resulted in greater valuation being assigned to an object (Kahneman et al., 1990; Strahilevitz & Loewenstein, 1998). It is therefore reasonable to assume that by asking participants to imagine owning those nostalgic items previously, it was adequate in evoking a sense of nostalgic towards the items.

Moreover, the nostalgic items in this study were framed mainly to evoke sentimental feelings towards the items. Therefore, it was reasonable to assume that sentimental feelings associated with the items should be the most salient in participants' mind while they were answering the questions. This, should be among the most influential factors in their valuation judgement.

Taken together, the outcome of this study suggests that the extent to which individuals with nostalgic tendencies assign greater value to nostalgic items are culturally dependent.

3.7 Discussion

The studies in this chapter investigated the possible downstream effects of time-related tendencies, namely the influence of temporal orientation on phenomenological characteristics of mental representation (Study 2 & 3) and also the potential downstream effect of temporal orientation on valuation judgements (Study 4). Overall, there are observable cultural variations in mental representation as a function of temporal orientation, and this is especially prominent among English-speakers.

Study 2 extended previous findings of a stronger future orientation among English-speakers (Caruso et al., 2008; Caruso et al., 2013), showing that English-speakers' future oriented frame of mind can be observed in their phenomenological characteristics of mental representations (e.g., more intense emotional response and greater contextual details). Such findings are in line with their psychological distance ratings observed in Study 2 and also their feelings of being psychologically closer to the future in general as observed in Study 1.

On the other hand, Mandarin-speakers' non-differentiated mental representation phenomenological characteristics of past and future event observed in Study 2 is in line with their equidistant psychological distance ratings. However, this finding is contrary to previous findings of a stronger past orientation among East Asians (e.g., Guo et al., 2012).

By comparing mental representation of events located at different temporal regions. The results of Study 3 provided converging evidence that psychological distance is an

important driving variable that influences mental representations, showing that temporally closer event was also rated as psychologically closer and consisting of greater contextual details compared to temporally more distant event. This finding is consistent with previous research (D'Argembeau & Van der Linde, 2004; Johnson et al., 1988) and is also in line with the predictions of CLT (Trope & Liberman, 2010).

The reason for the lack of a difference between representations of future and past events among Mandarin-speakers is unclear. One might suspect that perhaps the preferred way to mentally represent object or event might vary cross-culturally. In other words, individuals with different cultural backgrounds might have tendency to imagine or recall in certain ways. For instance, people might have natural tendency to imagine or recall either by generating more images or using abstract messages such as words. However, the results of Study 3 argue against this explanation. Study 3 showed that phenomenological characteristics of participants' mental representation varied as a function of objective temporal distance and psychological distance towards the event in question, and that this applied equally to both English and Mandarin-speakers.

Following the findings of a cultural effect on mental representation, Study 4 was conducted to explore the possibility of an effect of culture on judgement through mental representation. It also used a different and novel measure, nostalgic tendency scale (i.e., SNS) as an indication of past orientation. Interestingly, although English-speakers reported themselves to be less nostalgic than Mandarin-speakers, nostalgic tendency was found to be associated with their nostalgic item valuations to a greater extent compared to Mandarin-speakers. This provides a possible explanation for the greater endowment effect observed among Western individuals previously (Maddux et al., 2010; but see Gobel et al, 2014). Their greater valuation placed on endowed items is possibly related to their greater

perceived connection between the item and the past. This suggestion is consistent with previous work showing that duration of ownership enhances endowment effects (Strahilevitz & Loewenstein, 1998). Importantly, this shows that culture, cognition, and judgment have a complex relationship.

Apart from observation regarding cultural variation, the studies in the present chapter have shown that some basic human tendencies are universal. For example, both cultural groups consistently rated their imaginations to be emotionally more positive than their memories (Study 2 & 3) which is in-line with a greater optimism bias towards future event commonly exhibited among individuals. In addition, objectively closer event was also rated as psychologically closer and contained greater phenomenological characteristics compared to objectively or psychologically more distant event.

Having now considered the temporal orientation line of enquiry, the next chapter will turn to another time-related cognition, namely the use of time metaphor between English and Mandarin-speakers. In addition, it also explores the relationship between the use of time metaphor and downstream judgement and decision, including optimism bias and risk-taking tendency.

Chapter 4: Time Perception: Implications for Judgment and Decision-making

The results of Study 1 showed supportive findings of cultural differences in the use of time metaphor. Specifically, English-speakers were more likely to use ego-moving metaphors whereas Mandarin-speakers were more likely to use time-moving metaphors. Next, I sought to continue this line of investigation by exploring the possible downstream effects of the use of time metaphor.

As described previously, a central distinction between ego-moving and time-moving metaphorical representations is the extent to which the self is perceived as active and in motion. As implied in the linguistic framework (McGlone & Pfiester, 2009) and some previous studies (Boltz & Yum, 2010; Lee & Ji, 2014; Ruscher, 2011) which examined the relationship between the use of time metaphor and judgement, a possible implication of this distinction is that individuals who endorse an ego-moving metaphor (vs. time-moving metaphor) may perceive themselves to possess a greater degree of personal control over event outcomes. Consistent with this conjecture, psychological studies on locus of control (e.g., Sastry & Ross, 1998) and fundamental attribution bias (e.g., Choi, et al., 1999) reported that Westerners – who are more likely to endorse ego-moving metaphors – have a greater internal locus of control and higher sense of agency respectively, compared to East Asians, where less emphasis is placed on the value of being in control.

However, although the observations of cultural variations in locus of control (Sastry & Ross, 1998) and attribution of event causality (Choi et al., 1999) are consistent with the more frequent use of ego-moving metaphor and time-moving metaphor among English-

speakers and Mandarin-speakers respectively, the hypothesis that the use of time metaphor is related to perceived personal control has never been directly tested.

Perceiving greater personal control may be linked to a number of decision-making outcomes. For instance, studies found that perceived personal control is related to the optimism one has (Harris, 1996; Helweg-Larsen & Shepperd, 2001) and also one's risk taking tendency (Klein & Kunda, 1994). The literature on optimism bias has shown that one's perceived control over an event's outcome is related to optimistic belief bias (Harris, 1996; Helweg-Larsen & Shepperd, 2001). Specifically, people who perceived themselves to have greater control over an event's outcome tend to have greater optimism belief bias. This is presumably due to their biased belief that the more controllable an event is, the more likely they are able to prevent the undesirable outcome. For example, if a driver believes he has a lot of control over getting involved in an accident, he is more likely to view his risk of getting involved in an accident as relatively low. Similarly, a study by Klein and Kunda (1994) showed that people's biased beliefs of being able to control their outcomes was related to the extent to which they displayed the 'better-than-average' effect (a self-serving bias reflecting the belief that one is 'above average' on positive attributes).

When it comes to self-related aspects, people show the tendency of seeing themselves in a self-serving manner and hold biased beliefs about themselves. This biased perception of the self is thought to serve a self-serving motive, to maintain and sustain our positive self-esteem (Sedikides, Rudich, Gregg, Kumashiro, & Rusbult, 2004). This self-enhancement tendency is pervasive covering many aspects of daily life including our communication ability (Keysar & Henly, 2002); driving ability (McKenna & Myers, 1997), not getting injured or killed in an automobile accident (Rutter, Quine, & Albery, 1998); work

performance (Stajkovic & Luchins, 1998); and physical appearance (Eply & Whitchurch, 2008) among others.

Research on unrealistic optimism bias typically asks participants to compare themselves to an average other (e.g., Weinstein, 1980). People often tend to be unrealistically positive about their future life events, think that good things are more likely to happen to themselves whereas bad things are more likely to happen to others, a phenomenon known as unrealistic optimism (Weinstein, 1980). Unrealistic optimism is a self-positivity bias and is found to be a robust observation. Although various personal (e.g., mood, personality) and situational (e.g., prior experience) factors have been proposed to affect the extent to which people display this bias (Helweg-Larsen & Shepperd, 2001), the perception of control over an event or its outcome was found to be a particularly influential factor, with greater perceptions of control being associated with greater unrealistic optimism bias (see meta-analysis by Klein & Helweg-Larsen, 2002). Apparently, the perception of being able to exert control over an event's outcome may lead people to think that they have better chances of achieving desirable outcomes or avoiding undesirable ones.

In a pioneering study conducted by Weinstein (1980), college students were asked to rate their chances of experiencing some positive and negative life events by comparing their chances with those of the average student. Those students who were unrealistically optimistic about their future rated themselves to be more likely to experience positive events but less likely to experience negative events compared to the average student. For example, compared to their average peers, college students believe they are more likely to get a good job, live longer, own their own home; and less likely than the average peer to divorce, have heart attack or lung cancer, drop out of college, or have drinking problem.

Similar findings have been reported in a number of subsequent studies (Weinstein, 1982, 1983, 1984, 1987).

Thus, unrealistic optimism appears to be a robust phenomenon. However, cross-cultural studies examining various positive and negative life events and using different comparison methods have painted a mixed picture on this. Some researchers have argued that unrealistic optimism is a self-enhancing bias that is culturally variant, as the benefit of maintaining positive illusions is culturally specified (e.g., Heine & Lehman, 1995; Heine, Lehman, Markus, & Kitayama, 1999). The argument put forward is that positive illusions serve to maintain the view that the self is a worthy person (Markus & Kitayama, 1991). This motive is more salient among individuals with independent self-construals (i.e., Westerners). In contrast, individuals with an interdependent self-construal (e.g., Asians) prioritize the ability to 'fit in' and not 'stand out' in order to maintain harmonious interpersonal relationships. As a result, self-enhancement tendencies such as unrealistic optimism are less strong among East Asians compared to Western individuals (Kitayama, Markus, Matsumoto, & Norasakkunkit, 1997).

Nevertheless, people's tendency to be optimistic also appears to be directly related to the type of event and the specific controllability they perceive themselves to have over the event (Chang, et al., 2001; Joshi & Carter, 2013). Optimism bias is likely to be related to different underlying motivation or cognitive processes (Hoorens, 1996). For instance, higher optimism bias tends to be expressed for events that are perceived to be more controllable. For example, participants who rated divorce as relatively more controllable also rated their chances of experiencing this event as relatively lower than their peers (Joshi & Carter, 2013).

Accordingly, greater perception of control has been found to have wide implications (e.g., risk perception and risk-related behaviours) (Helweg-Larsen & Shepperd, 2001). For

instance, people's perception of risk and their perceived tolerance of different types of risk are contingent upon their perceived ability to control an event or its outcome (Klein & Kunda, 1994; Slovic, 1987; Vlek & Stallen, 1980). The attractiveness of a risky option can be enhanced by the perceived controllability over the event's outcome. People who perceive an event to be more controllable will be more likely to rate their own risk of receiving an undesirable outcome as lower than the average (e.g., Klein & Kunda, 1994). The perception of risk has serious implications for the course of action and the decisions we make in daily lives. For example, when people who were led to believe their risk of getting involved in an accident was greater than the average others, they showed greater intention to take precautionary actions (e.g., McKenna, Stainer, & Lewis, 1991).

Most of the decisions we make in our daily lives involve different levels of risk and these risks vary greatly in different life domains including financial, health, ethical, social, or recreational. When deliberating decisions, we often have to weigh our tolerance for risk against the possibility of achieving greater gains, as desirable options often involve undesirable aspects. For instance, financial decisions such as whether to put our savings in the bank during the current low interest rate environment or to invest in the volatile stock market require weighing the risk of losing our saving against the potential for a better return. Health decisions such as whether to endure inoculations before travelling to a high-risk destination, pit one's perception of long-term risk against one's shorter-term comfort. Similarly, ethical, social, and recreational decisions require us to weigh the likelihoods of various outcomes that differ in their certainty, desirability, pleasantness, and temporal or spatial proximity. Thus, individuals' risk-taking is multifaceted and complicated as the options often require one to assume different levels of risk to achieve more or less desirable outcomes.

Studies 5 and 6 in this chapter sought to explore the role of the use of time metaphor in optimism and in risk-taking tendencies. Study 5 investigated cultural differences in unrealistic optimism and tested the hypothesis that the use of time metaphor will act as a mediator. Study 6 examined cultural differences in risk taking and explored the role of time metaphors in individuals' risk-taking tendencies. It was hypothesized that perceptions of control would be predicted by the use of different time metaphors, which were expected to vary by culture. Furthermore, individuals' level of unrealistic optimism bias (Study 5) and risk-taking tendency (Study 6) were expected to be related to their perception of control. Specifically, a time-moving metaphor (characterized by a passive sense of self) was hypothesized to be related to lower sense of control and hence lower levels of optimism (Study 5) and lower risk-taking tendency (Study 6). On the other hand, an ego-moving metaphor (which fosters a more active sense of self) was expected to be related to higher perceived controllability and consequently higher levels of optimism (Study 5) and higher risk-taking tendency (Study 6).

4.1 Study 5: Time Metaphors, Perceived Control, and Unrealistic Optimism

4.1.1 Introduction

This study will be the first to explore the complex relationship between the use of time metaphor, sense of personal control, and unrealistic optimism in different cultures. To test these associations, the relationship between individuals' perceptions of control and their use of metaphorical representation of time was explored, followed by the role of the use of time metaphor in individual's unrealistic optimism towards positive and negative life events. It was expected that the use of ego-moving metaphors would be related to higher perceived control whereas the use of time-moving metaphors would predict higher external locus of control. In addition, time metaphors should act as a mediator, such that culture influences an individual's unrealistic optimism via the use of diverse metaphors. Specifically, time-moving metaphors are hypothesized to predict lower optimism towards life events. On the other hand, ego-moving metaphors should produce greater agency which should in turn lead to higher levels of optimism.

Study 5 also sought to replicate the observation of cultural differences of time perception in Study 1 – the use of time metaphor and temporal orientation. In study 1, participants' temporal orientation was assessed by using a simple psychological distance question - participants were asked to rate their perceived subjective distance (close vs. further away) of the same day one month in the past (vs. future). Although it was found that English-speakers felt closer a day one month in the future (vs. the same day one month in the past), Mandarin-speakers did not feel closer to a day one month in the past. Subsequent study (Study 2) found that English-speakers felt psychologically closer to a past event (vs. a future event) whereas Mandarin-speakers felt equidistant to the event (future vs. past). Study 5 attempts to replicate the finding of cultural differences in temporal orientation by

adapting and modifying the measure used in Study 1 – by using a continuous rating scale (i.e., a line which anchored by 'Now' and 'Past' or 'Future' on the two extreme ends).

Participants' use of time metaphors was investigated using the same measure used in Study 1 but excluding one of the spatial ambiguous questions (i.e., the alphabet question). In addition, the relationship between the use of ego-moving metaphor and psychological distance to the future will also be examined in this study. It was suspected that the use of time metaphor would be related to temporal orientation such that the use of ego-moving metaphor would be associated with a reduced psychological distance towards the future and an increased psychological distance towards the past.

Participants' unrealistic optimism will be assessed using the list of future life events from Joshi and Carter (2013) which was modified and adapted from Weinstein (1980) to examine the optimism bias between Western (i.e., English) and Asian (i.e., Indian participants). As highlighted in their research report, some of the future event list which was developed for used in the U.S by Weinstein (1980) were not suitable for Asian individuals (e.g., being injured while skiing, car turns out to be a lemon).

In the present study, Rotter's (1966) locus of control scale which was used to investigate participants' perception of control was replaced by Levenson's (1981) IPC scale - The Internality, Powerful others, and Chance scale. IPC scale was designed to assess individual's interpretation of the primary causation of event across different domains. It is a three-dimensional locus of control model which makes distinction between chance and powerful others as external influence, designed to assess individual's interpretation of the primary causation of event across different domains. This scale has been translated and validated in multiple countries (e.g., U.S.A - Krampen & Wieberg, 2010; China - Lao, 1978; Japan - Krampen & Wieberg, 2010; Netherlands - Brosschot, Gebhardt, & Godaert, 1994). It

has been established in the literature that people's perception of control is complex and multidimensional (e.g., Skinner, 1996), therefore Study 5 intends to further examine the possible correlation between the use of time metaphor and locus of control in detailed by looking at the three dimensions proposed, namely internal, powerful others, and chance orientations.

4.1.2 Method

Participants

The sample size was determined by referencing a related study (Joshi & Carter, 2013) in order to detect a difference in event optimism. With an effect size of $d = 0.41$, G*Power analysis (Faul, et al., 2009) showed that a sample size of at least 95 in each cultural group was required to reliably detect a difference in life event optimism with 0.80 power. One hundred eighty-nine participants completed the study. These included 99 English-speakers recruited from University of Plymouth and 90 Mandarin-speakers from universities in China. English participants were undergraduate students who were reimbursed £4 for completing the questionnaire online in a laboratory setting which formed part of a larger unrelated study. Mandarin-speakers were undergraduate students from universities in China which were recruited via an online survey platform (www.sojump.com). Mandarin-speakers were offered a chance to enter a prize lucky draw for completing the questionnaire online.

Out of the 189 participants who participated in this study, 6 participants failed to complete all of the items and their data were therefore excluded, leaving 183 participants. There were 93 English-speakers (63 females, $M_{age} = 20.63$, $SD_{age} = 1.52$) and 90 Mandarin-speakers (48 females, $M_{age} = 20.33$, $SD_{age} = 2.65$). The majority of the English-speakers were

born in the U.K. (99%). One of them was born in Australia (1%). All Mandarin-speakers were born in China.

Materials

Participants completed a series of measures in fixed order:

Unrealistic Optimism: All respondents completed the unrealistic optimism questionnaire that included 10 potential positive and 10 potential negative future life events. The list of future life events was adopted from Joshi and Carter's study (2013). See Appendix D – Part I for a full list of life events.

Participants were randomly allocated to one of two versions of questionnaire which varied in the instructions given (see Appendix D – Part II for instructions)¹⁸. There were asked to rate the probability of these events happening to themselves (*"the following statements each describe a specific event. In each case, rate how likely do you think are the chances that the following events will happen to you?"*) and to people like themselves (*"the following statements each describe a specific event. In each case, rate how likely do you think are the chances that the following events will happen to you?"*) using a scale range from 0% (*extremely unlikely*) to 100% (*extremely likely*). Mixing positive and negative events, the 20 events were presented in random order. Cronbach's alpha was 0.78 for positive event optimism and 0.81 for negative event optimism.

In addition, participants were also asked to assess the controllability of each of the life event. All the 20 life events were presented in random order, the participants were asked *"in each case, rate how controllable do you think the following events are?"* on a 7-

¹⁸ There was no significant difference in responses on the optimism score, controllability rating, and perception of control measure between the two versions of questionnaire [largest $F(1, 179) = 2.096, p = 0.149$]

point scale (1 = *not at all controllable*, 7 = *very controllable*). Cronbach's alpha was 0.77 for positive event controllability and 0.81 for negative event controllability. Participants were also asked to rank the 10 positive events from the very best event to the least good event (1= *the very best event*, 10 = *the least good event*) and the 10 negative events from the very worst event to the least bad event (1 = *the very worst event*, 10 = *the least bad event*).

Time Perception: Participants completed the same measures of time orientation and of their metaphorical representations of time as were described in Study 1, with two modifications. First, a five-item version of the time metaphor measure was used (excluding one of the spatial items from the original version¹⁹). Second, the rating scale used for the temporal orientation questions was replaced with a continuous line (due to the use of paper version for English-speakers and on-line rating scale for Mandarin-speakers, the length of the line is 155mm for English-speakers; 100mm for Mandarin version) anchored by 'Now' and 'Past' or 'Future' on both extremes of the line. Participants marked their responses which was measured in terms of mm from the anchor 'Now'. Participants' responses were computed as a ratio of the perceived psychological distance over the total length of the line. English-speakers completed the paper version whereas Mandarin-speakers completed the on-line version of the temporal orientation questionnaire.

Perceived Control: Participants completed the Internality, Powerful others, and Chance (IPC) scale (Levenson, 1981). Cronbach's alpha was 0.62 for Internality, 0.64 for Chance, and 0.76 for Powerful others.

Participants first rated the chances that each of the event will happen to themselves, rated the controllability of each of the event, ranked the order of negative event's desirability, the chances that those events will happen to other people, and lastly, they

¹⁹ The alphabet question

ranked the order of positive events in terms of the event's desirability. The time perception and perceived control measures were dispersed among the unrealistic optimism questionnaire.

Procedure

Mandarin-speakers answered all the questions online by clicking on links to the study whereas English-speakers completed the questionnaire online in a laboratory setting. After participants consented to participate in the study, they were asked to provide some basic demographic information (e.g. sex, age, first language, country of birth, and country of residing at time of participation) prior to the start of the questionnaire. Upon completion of the study, participants were thanked and debriefed.

4.1.3 Results

Post-hoc power analysis (Faul, et al., 2009) revealed that with a sample size of 183, effect size of $d = 0.41$, the power achieved to detect the difference in life event optimism was .79.

Cultural Differences in the Use of Time Metaphors

Participants' metaphorical representations of time were analysed as the proportion of ego-moving responses selected. In order to examine differences in ego-moving response between English and Mandarin-speakers, an independent-samples t -test was conducted. Given a violation of Levene's test for homogeneity of variances, $F(1, 181) = 523.84, p < .001$, a t -test not assuming homogeneous variances was calculated. The results of this test revealed a significant difference in ego-moving response between the two groups, $t(94.06) =$

23.26, $p < .001$, $d = 3.35$. English-speakers selected significantly more ego-moving responses ($M = .70$, $SD = .29$) than Mandarin-speakers ($M = .004$, $SD = .03$).

Cultural Differences in Psychological Distance

Due to the use of different rating scales among English and Mandarin-speakers, participants' ratings of psychological distance were converted into z-scores. The z-scores of psychological distance rating to one month in the past vs. future were entered as repeated measures in a mixed-model ANOVA with culture (English vs. Mandarin) as a between-participants factor. Whilst estimates of distance from the past vs. future did not significantly differ [$F(1, 179) = .87$, $p = .35$, $\eta^2_p = .005$], there was a marginally significant effect of culture [$F(1, 179) = 3.69$, $p = .056$, $\eta^2_p = .020$] such that English-speakers reported greater psychological distance from both time points than did Mandarin speakers. However, the main effect was moderated by time point, $F(1, 179) = 9.01$, $p = .003$, $\eta^2_p = .048$. Post-hoc analysis (Bonferroni corrected $\alpha = .025$) indicted that English-speakers felt psychologically closer to a day one month in the future [$t(90) = 3.19$, $p = .002$, $d = -.34$] whereas there was no difference between Mandarin-speakers' past and future ratings [$t(89) = -1.312$, $p = .19$, $d = .11$]. See Table 4.1 for means and standard deviations of psychological distance ratings.

Table 4.1. *Mean ratings of psychological distance as a function of temporal direction and culture in Study 5.*

Culture	Past <i>M (SD)</i>	Future <i>M (SD)</i>
English ($n = 91$)	.34 (.29)	.27 (.27)
Mandarin ($n = 90$)	.36 (.22)	.39 (.25)

Note: Standard deviations are shown in parentheses. Psychological distance rating was converted into z-scores. Higher scores indicate greater distance.

Relationship between the use of ego-moving metaphor and temporal orientation

As mentioned earlier, it was suspected that the use of time metaphor would be related to temporal orientation such that the use of ego-moving metaphor would be associated with reduced psychological distance towards the future and increased psychological distance towards the past. This relationship did not emerge for the overall sample, nor did it emerge when English and Mandarin-speakers were considered separately. See Table 4.2 for the correlations between the use of ego-moving metaphor and psychological distance ratings.

Table 4.2 *Pearson's correlation between ego-moving metaphor score and psychological distance ratings by temporal direction and culture in Study 5.*

Culture	Past	Future
Overall sample ($N = 181$)	.02	-.13
English ($n = 91$)	.11	.18
Mandarin ($n = 90$)	-.03	.01

Event desirability

As described in the method section, participants were also asked to rank each positive and negative event for desirability. The desirability ranking of the 10 positive events was very similar between English and Mandarin-speakers, $\rho(10) = .915$, $p < .001$. The same was observed for the 10 negative events, $\rho(10) = .915$, $p < .001$.

Perceived Control & Unrealistic Optimism

Participants' scores on the Internality, Powerful others, and Chance subscales of the IPC measure were entered into a multivariate ANOVA with culture as a between-

participants factor. There was no significant multivariate effect of culture, $F(1, 179) = 0.85$, $p = .47$, $\eta^2_p = .014$. No significant effect emerged on any subscale (Internality: $F(1, 181) = 0.113$, $p = .74$, $\eta^2_p = .001$; Power others: $F(1, 181) = 1.97$, $p = .16$, $\eta^2_p = .011$; Chance: $F(1, 181) = 1.08$, $p = .30$, $\eta^2_p = .006$). See Table 4.3.

Table 4.3 Mean ratings of IPC sub-scales as a function of culture in Study 5

Culture	Internality <i>M (SD)</i>	Powerful Others <i>M (SD)</i>	Chance <i>M (SD)</i>
English (<i>n</i> = 93)	30.76 (5.68)	20.44 (6.35)	20.68 (6.37)
Mandarin (<i>n</i> = 90)	31.06 (6.05)	21.99 (8.46)	21.66 (6.35)

Note: Standard deviations are shown in parentheses. Higher scores indicate greater control.

Unrealistic optimism scores were computed separately for positive and negative events. Because optimism is defined here as making *relatively* positive judgments for the self than for others, I computed positive scores by subtracting the perceived likelihood that a positive event would happen to others from the perceived likelihood that the same event would happen to oneself. Likewise, negative scores were computed by subtracting the perceived likelihood of a negative event would happen to oneself from the perceived likelihood that the same event would happen to others. These scores were then entered as repeated measures in a mixed-model ANOVA with culture as a between-participants factor. This analysis produced a significant main effect of event valence [$F(1, 181) = 32.35$, $p < .001$, $\eta^2_p = .152$] such that participants were more optimistic about negative events *not happening* to them ($M = .08$, $SD = .16$) than they were about positive events *happening* to them ($M = .01$, $SD = .14$). This effect was not qualified by culture [$F(1, 181) = 2.21$, $p = .139$, $\eta^2_p = .012$],

nor was there a significant main effect of culture [$F(1, 181) = 0.11, p = .745, \eta^2_p = .001$]. See Table 4.4 for means and standard deviations of optimism ratings.

Table 4.4 *Mean ratings of optimism as a function of event valence and culture in Study 5*

Culture	Positive <i>M (SD)</i>	Negative <i>M (SD)</i>
English ($n = 93$)	0.01 (0.12)	0.07 (0.14)
Mandarin ($n = 90$)	0.01 (0.16)	0.10 (0.17)

Note: Standard deviations are shown in parentheses. Higher scores indicate greater optimism.

Perceived controllability judgments of the same positive and negative events were analysed in a parallel mixed-model ANOVA. This analysis also produced a significant main effect of valence [$F(1, 181) = 70.87, p < .001, \eta^2_p = .281$] such that both English and Mandarin-speakers rated positive events ($M = 4.46, SD = 0.85$) to be more controllable than negative events ($M = 3.72, SD = 1.06$). However, this effect was qualified by culture, $F(1, 181) = 14.37, p < .001, \eta^2_p = .074$. Post-hoc analyses (Bonferroni corrected $\alpha = .025$) indicate that Mandarin-speakers perceived positive events to be more controllable than English-speakers [$F(1, 181) = 17.20, p = .001, \eta^2_p = .087$] whereas there was no difference between their controllability ratings for negative events [$F(1, 181) = 1.17, p = .281, \eta^2_p = .006$]. Nonetheless, the main effect of culture did not reach significance, $F(1, 181) = 2.30, p = .131, \eta^2_p = .013$. See Table 4.5 for means and standard deviations of event controllability ratings.

Table 4.5 Mean ratings of controllability as a function of event valence and culture in Study 5

Culture	Positive <i>M (SD)</i>	Negative <i>M (SD)</i>
English (<i>n</i> = 93)	4.22 (0.65)	3.81 (0.80)
Mandarin (<i>n</i> = 90)	4.71 (0.96)	3.64 (1.28)

Note: Standard deviations are shown in parentheses. Controllability was rated using a scale ranging from 1 to 7. Higher scores indicate greater control.

Relationships among measures

It was hypothesized that optimism about positive and negative events would be predicted by general perceptions of control (i.e., the Internality subscale of the IPC relative to the Powerful others and Chance subscales) and specific measures of personal control (i.e., judgments of how controllable the positive and negative events were). Perceptions of control were, in turn, hypothesized to be predicted by the use of ego-moving metaphors of time, which we expected to vary by culture.

In examining the evidence for these hypotheses, regression analysis was first carried out to see whether the use of ego-moving metaphors predicted general perceptions of control. The use of ego-moving metaphor did not significantly predict general perceptions of control, $R^2 = .02$, $F(1, 182) = 0.06$, $p = .815$.

Next, parallel regression analyses were carried out to test whether specific and general perceptions of control predicted optimism about positive and negative events. In the analysis of optimism relating to positive events, both specific and general perceptions of personal controllability were weak and non-significant predictors, $R^2 = .027$, $F(2, 180) = 2.47$, $p = .088$. Neither general perceptions of control (defined as the average of Powerful other and Chance subscale scores subtracted from Internality subscale scores) nor judgements of controllability over the specific events were individually predictive, $\beta = .09$, $p = .27$ and β

= .12, $p = .13$ respectively. In the analysis of optimism relating to negative events, the pattern was somewhat different. Specific and general perceptions of personal controllability combined to account for significant variance, $R^2 = .048$, $F(2, 180) = 4.54$, $p = .012$. Whilst general perceptions of control did not predict optimism regarding negative events ($\beta = .04$, $p = .57$), perceptions of personal control over the specific events were a reliable predictor ($\beta = .22$, $p = .003$). Thus, overall there was somewhat inconsistent evidence regarding the influence of perceived personal control on optimistic judgments – to the extent that such an influence exists, it appears to be stronger for negative than for positive outcomes.

In the analysis of specific event optimism relating to the event in both cultural groups separately, specific perception of control was a reliable predictor for both positive [$R^2 = .037$, $F(1, 91) = 4.53$, $p = .036$] and negative event optimism [$R^2 = .041$, $F(1, 91) = 4.97$, $p = .028$] among the English-speakers. On the other hand, specific perception of control was only a reliable predictor for negative event optimism [$R^2 = .039$, $F(1, 88) = 4.65$, $p = .034$] but not for positive event optimism [$R^2 = .007$, $F(1, 88) = 1.62$, $p = .206$] among Mandarin-speakers. Fig. 4.1 shows the mean ratings of event optimism as a function of culture and specific event controllability for both positive and negative life events. The regression line fitted implied that controllability has a positive relationship with optimism ratings for both types of events in both cultural groups.

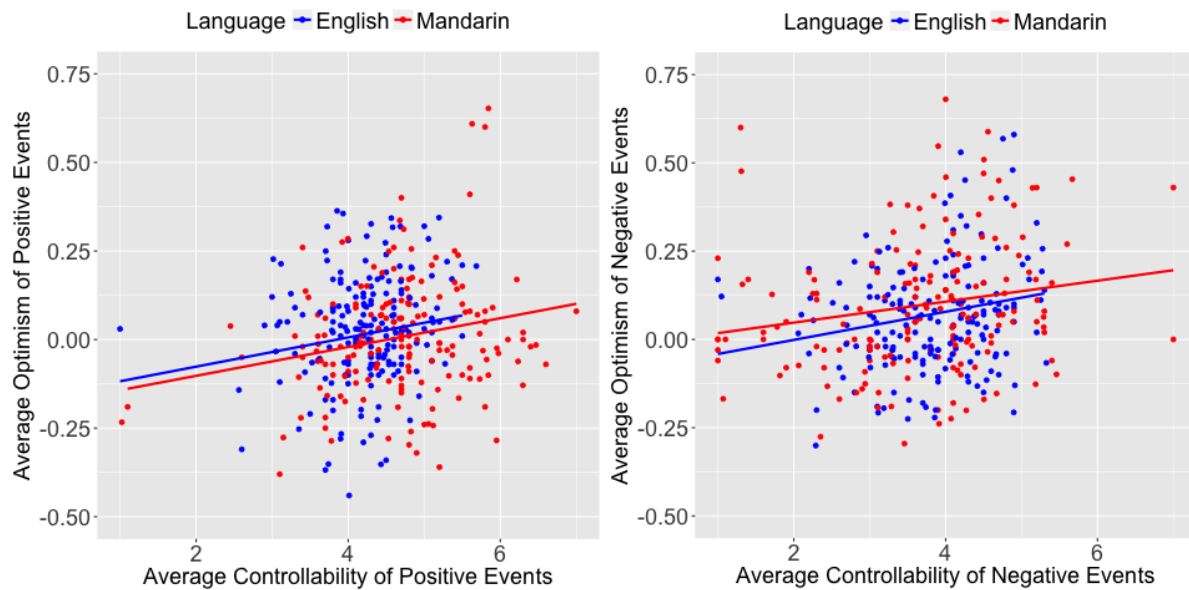


Figure 4.1 Average mean ratings of event optimism as a function of culture and specific event controllability for positive (**left panel**) and negative (**right panel**) life events.

Turning to the hypothesis that culture and metaphorical representations of time would predict perceptions of control (and consequently optimistic judgments), little evidence was found to support this. As noted above, there were no cultural differences either in (specific or general) perceived personal control or in optimistic judgments. Moreover, participants' tendencies to use ego-moving metaphors of time bore little relationship to their reports of perceived control or optimism levels. The sole significant correlation to emerge relating to time metaphors was a *negative* correlation between the use of ego-moving metaphors and perceived control over positive events, $r(183) = -.286$, $p < .001$ (all other r 's $< .11$, p 's $> .14$). See Appendix E for a complete correlation matrix.

4.1.4 Discussion of Study 5

In terms of time perception, the results of Study 5 were somewhat consistent with the results of Study 1. On the use of time metaphors, English-speakers again showed strong tendency to use ego-moving metaphors whereas the use of time-moving metaphors was

more common among Mandarin-speakers. The results of the psychological distance measure were similar to what was discovered in Study 1 and Study 2 as English-speakers rated the future to be subjectively closer whereas Mandarin-speakers did not feel closer to the past. In addition, there was little evidence of an association between the use of ego-moving metaphor and psychological distance to the past and future - a finding consistent with the observation in Study 1.

Judging by the low time-moving score on the time metaphor ambiguous questions, Mandarin-speakers appeared to have a strong tendency to adopt a time-moving metaphor. One might question that to what extent the result obtained was due to the conceptual structures of the questions used instead of people's time perception in general. The fact that the present study is a cross-cultural study therefore the use of testing materials in different languages are unavoidable. As a result, it is difficult to rule out the possibility that the result is simply driven by linguistic framework differences in the time metaphor ambiguous questions between the two languages. However, a similar cross-cultural study (Lai & Boroditsky, 2013) comparing the performance of native English-speakers, Mandarin-English (ME) bilinguals, and Mandarin monolinguals' on the meeting and clock questions demonstrated that when ME bilinguals were tested in English they were still more likely to use time-moving metaphors albeit to a less extent in comparison to Mandarin monolinguals. The performance of ME bilinguals in English was situated between those of English monolinguals and Mandarin monolinguals. Participant's English proficiency was positively correlated with ego-moving responses. Although the testing materials in this study were formatted in participant's native language and therefore we could not rule out the influence of language on performance, previous findings showed that even when tested in foreign

language Mandarin-speakers were still less likely to take ego-moving metaphors than English-speakers supporting the results of this study.

Results in Study 5 confirmed the presence of unrealistic optimism bias among English-speakers and Mandarin-speakers. Participants from both cultural groups overestimated the chances of positive events happening to oneself and underestimated the chances of negative events happening to themselves (vs. average others). In order to ensure that the events presented shared similar meaning cross-culturally, participants were also asked to rank the events in terms of its desirability in order to present a cross-cultural comparison of event desirability. The ranking order by English and Mandarin-speakers showed that the desirability of events in these two cultures was very similar, therefore it is unlikely that event desirability can be held responsible for the cultural differences observed.

As described earlier, one of the most common explanations of the observation of cultural differences in unrealistic optimism is the self-enhancing bias. Specifically, Westerners have greater motivation to self-enhance in order to better present themselves as a worthy and high self-esteem person (Markus & Kitayama, 1991) which is consistent with the characteristics of individualistic societies which emphasize agency, a sense of independent self, and the individual as a unique entity. In contrast, self-enhancement is deemed less desirable among East Asian individuals due to the collectivistic nature of East Asian societies which places greater priority on harmonious interpersonal relationship and also an interdependent sense of self. However, the observation of Mandarin-speakers to be self-enhancing in both positive and negative events showed that unrealistic optimism can be observed among East Asian individuals who live in a collectivistic society. One possible explanation to this observation is perhaps the Mandarin-speakers recruited in this study were less collectivistic than the literature suggested. The Mandarin-speaking participants

were Chinese university students aged 18 to 25. The dramatic social and economic change in Chinese society since the early 1990s might have shifted the priority Chinese individuals place in collectivism and make their society increasingly individualistic (Steele & Lynch, 2013).

The reliability of the questions of the IPC sub-scales was assessed with the Cronbach's alpha level for internality (0.62) and Chance (0.64) appeared to be lower than that of powerful-others (0.76). A low Cronbach's alpha might be an indication of low internal consistency (Cronbach, 1951). Further factor analysis of these two sub-scales revealed that all the seven questions from both scales were strongly loaded on a single dimension respectively with one of the question from each scale respectively loaded on a second factor on its own (internality: *"How many friends I have depends on how nice a person I am"*; chance: *"I have often found that what is going to happen will happen"*). Further analysis showed that removing each of the question from the scale will slightly improve the reliability level (internality: improved to 0.664; chance: improved to 0.672). However, further analysis conducted for each of the related analysis by removing the responses for those two questions from internality and chance sub-scale respectively showed that the results did not change the current conclusion¹²⁰.

In general, participants were comparatively more optimistic about negative events not happening to themselves than they were about positive events happening to them. Specific controllability towards negative event was found to be a reliable predictor of negative event optimism in both cultures. In the analysis of specific event optimism relating to the event controllability in the two cultures separately, for English-speakers, specific

²⁰ Participants' scores on the Internality, and Chance subscales of the IPC measure were entered into a multivariate ANOVA with culture as a between-participants factor. No significant effects emerged on both subscale (internality: $F(1, 181) = 0.18, p = .672, \eta^2_p = .001$; chance: $F(1, 181) = 0.943, p = .333, \eta^2_p = .005$).

event controllability was positively related to both positive and negative event's optimism level although the relationship appears to be stronger for negative events. However, for Mandarin-speakers, specific event controllability only significantly related to negative event optimism ratings. The results thus substantiated the claim that positive event and negative event optimisms are two independent psychological mechanisms which are possibly sustained by different underlying motivation or cognitive processes (Hoorens, 1996).

For both cultures, individual's optimism bias towards negative events was found to be related to their perceived ability to control the negative event or the outcome of the events. This observation has important implications because the potential negative consequences associated with underestimating the occurrence of negative events might be greater than that of overestimating the positive ones (e.g., "I am a relatively skilful driver therefore I can drive at greater speed and not get involved in an accident). Underestimating the chances of negative events happening to oneself could be associated with more risky and unsafe behaviours which are more potentially hazardous (e.g., health-care behaviour: Menon, Block, & Ramanathan, 2002).

Turning back to the main hypothesis of the study, it was hypothesized that optimism about positive and negative events would be predicted by general and specific measures of personal control which, in turn, also hypothesized to be predicted by the use of ego-moving metaphors of time that was expected to vary by culture. As noted above, participants' tendencies to use ego-moving metaphors of time bore little relationship to their reports of perceived control or optimism levels. Moreover, there were no cultural differences either in (specific or general) perceived personal control or in optimistic judgments.

The next study intended to explore the relationship between the use of time metaphors and individuals' risk-taking tendency including their risk preferences (Study 6A) and risk-taking behaviours (Study 6B).

4.2 Study 6A & 6B: Relationship between Time Metaphors, Perceived Control, and Risk-taking Tendency

4.2.1 Introduction

This study intended to examine the mediator role time metaphor plays between culture and risk-taking by focusing on individual's risk-preferences (Study 6A) and risk-taking behaviour (Study 6B).

As discussed earlier, the use of ego-moving metaphors was found associated with an agentic or approach frame of mind whereas the use of time-moving metaphors was associated with a passive or avoidance outlook (Lee & Ji, 2014). Furthermore, the linguistic frameworks of ego and time-moving metaphors were also consistent with this finding, attribute the source of change to different entities (McGlone & Pfiester, 2009). It is thus suspected metaphorical representations of time may be related to one's degree of perceived control or personal agency which in turn may lead to higher (i.e., ego-moving metaphor) or lower (i.e. time-moving metaphor) risk-taking tendencies.

The perception of control is related to risk-taking (Chau & Phillips, 1995; Horswill & McKenna, 1999; McKenna, 1993). For example, people believe they are more able to avoid an automobile accident if they are the driver but not when they are a passenger (McKenna, 1993) – an exhibition of perceived control capacity. In an experiment which investigated people's risk-taking and perceived control when driving by using video simulation tests, participants were found willing to drive at faster speeds (i.e., at a faster speed than the vehicle in the video) when they imagined they were driving (vs. when they imagined they were passengers) (Horswill & McKenna, 1999) – suggest that perception of control is closely related to risk-taking tendency. Specifically, drivers who perceived themselves to have

greater control were more comfortable with higher driving speed (i.e., higher level of risk) compared to when they were not in control (i.e., passengers).

An explanation for the association between perception of control and risk taking is that, greater perception of control possibly leads to other associated positive beliefs or attributions which are likely to be self-serving in nature. For instance, Chau and Phillips (1995) investigated the phenomenon of gambling fallacy and found that, by taking previous outcomes into account, previous successful outcomes led participants to a greater belief that the outcomes were due to not just luck but also their own abilities (e.g., skill).

With the association between perception of control and risk taking in mind, it is thus expected that the use of ego-moving metaphor which is associated with a higher sense of agency would produce a sense of higher perceived personal control toward event outcome or environment. This sense of higher perceived personal control should in turn lead to a greater risk-taking tendency. In contrast, the use of a time-moving metaphor which is associated with a passive or avoidance mental states should be related to lower perceived control toward an event outcome which in turn should lead one to have lower risk-taking tendency.

Although this study is designed with the association of perceived personal control and risk-taking in mind, cross-cultural comparison studies in relation to risk-taking suggest that other factors might be at play, for instance, cultural context. Hsee and Weber (1999; cf Li & Fang, 2004) found that Chinese individuals were more risk taking in financial decisions compared to Americans but not in other decision domains (e.g., medical or academic). They proposed the 'cushion hypothesis' to explain such findings. According to them, the wider social network in relatively more collectivistic cultures act as a support and help 'cushion', in event that those individuals fail after taking substantial risks. Members of those cultures

expected to receive help from their social network such as friends and family should their decision fail. In contrast, individuals in relatively individualistic cultures are expected to take personal responsibility for possible losses. Presumably with the readily available social support to mitigate risk against failure, Chinese individuals are willing to take greater financial risk. Based on this, it is possible that people with a Chinese cultural background should exhibit greater risk taking in financial domain. This will serve as a competing hypothesis of this study.

The findings of Chinese individuals showing greater risk-taking tendency in financial domain but not in other decision domains (e.g., medical or academic) (Hsee & Weber, 1999) supported the suggestion that risk-taking tendencies are domain-specific, as people are not consistently risk-seeking or risk-avoidant across all decision domains (Rolison, Hanoch, Wood, & Liu, 2014; Weber et al., 2002). As decisions in different domains involve different types of risk and uncertainty, people might be willing to take risk in some situations but not in others.

In addition, risk-taking tendencies also change across an individual's life span (see meta-analysis by Mata, Josef, Samanez-Larkin, & Hertwig, 2011). For instance, men's risk-taking tendencies in financial domains and women's risk-taking tendencies in social domain were both found to decrease sharply in older age (Rolison, et al., 2014). Previous studies have shown that individual's risk-taking tendency can be influenced by many factors, including time pressure (Finucane et al., 2000), the decision-maker's ability to engage in probabilistic thinking (Lau & Ranyard, 2005); representation of risk information (White, Gummerum, & Hanoch, 2015), affect (Loewenstein, Weber, Hsee, & Welch, 2001); mood (Yuen & Lee, 2003), social factors (Hsee & Weber, 1999), or whether the decision is made alone or with others (Gardner & Steinberg, 2005).

Risk-taking has important implications for both an individual's course of action and his or her decision-making. It is a subjective and complex construct and therefore can be conceptualized and modeled in many different ways (see reviews, Yates & Stone, 1992). This study focuses on risk preference and risk-taking behavior. Risk preference is an individual's tendency to prefer a certain outcome over an option with a probabilistic outcome (Hsee & Weber, 1999) whereas risk-taking behaviour is self-reported risk-taking behavior in various decision domains.

This study focused on individuals' choices between a sure outcome and an outcome with specified probabilities (i.e. risk preferences) in Study 6A, and their willingness to engage in risky activities (i.e. risk-taking behaviour) in Study 6B. Choosing the sure option is characterized as risk averse and choosing the uncertain option is defined as risk taking. Specifically, the use of ego-moving metaphor is hypothesized to be related to higher control one perceives oneself to have, and in turn leads to higher risk-taking tendency. In contrast, individuals who take time-moving metaphor will feel less in control, which in turn leads to lower risk tolerance or lower risk-taking tendencies or lower risk preferences.

4.2.2 Study 6A – Participants, Materials, and Procedure

Participants

The sample size was determined by referencing a related cross-cultural study (Hsee & Weber, 1999). With an effect size of $d = 0.52$, G*Power analysis (Faul, et al., 2009) showed that a sample size of at least 68 in each cultural group was required to reliably detect a difference in investment risk-taking with 0.85 power. Two hundred and five university students completed the study. They included 100 English-speakers who were undergraduate students from University of Plymouth. They completed the questionnaire

online in a laboratory setting which formed part of a larger unrelated study and they were reimbursed £4 for their participation. 105 Mandarin-speakers who completed the study online were undergraduate students from universities in China which were recruited via an online survey platform (www.sojump.com). They were offered a chance to enter a prize draw for completing the questionnaire online.

All the responses were included in the analysis. They were 100 English-speakers (63 females, 1 missing data, $M_{age} = 20.35$, $SD = 1.50$) and 105 Mandarin-speakers (61 females, $M_{age} = 21.52$, $SD = 1.83$). The majority of the English-speakers were born in the U.K. (98%). The rest of them were born in the U.S.A. All Mandarin-speakers were born in China.

Materials

Time Metaphors: Participants completed the five-item version of the time metaphor measure described in Study 5.

Perceived Control: Participants completed the Internality, Powerful others, and Chance (IPC) scale (Levenson, 1981). Cronbach's alpha was 0.66 for Internality, 0.78 for Chance, and 0.75 for Powerful others.

Risk Preferences: Participants were randomly allocated to one of two versions of questionnaire²¹ which consists of a series of risk preferences measures on financial, monetary gamble, medical, and academic domains adopted from Hsee and Weber (1999). These two questionnaire versions differ in the question's arrangement order and the framing of monetary gambles (gain vs. loss). Each monetary gamble condition consists of

²¹ A multivariate MANOVA was conducted with questionnaire version and first language as between-participants factors and all other measures as dependent variables (e.g., ego-moving response, perceived control, and risk-preferences on academic, medical, and investment). The sole significant difference was a main effect of questionnaire version on academic risk-preference [$F(1, 203) = 9.29$, $p = .003$, $\eta_p^2 = .07$]. No significant interaction effect emerged (all F 's < 2.729, p 's > .101).

two sets of questions (i.e. the large and the small outcome size). The large outcome size question set always preceded the small outcome size question set. In addition, participants also completed the Asian disease problem (Tversky & Kahneman, 1981) which was presented in either a positive (i.e., *200 people will be saved*) or a negative frame (i.e., *400 people will die*). The cover story in the original problem was adapted by substituting 'UK' and 'China' for U.S. in the English version (i.e., Imagine that the U.K. is preparing for the outbreak...) and the Mandarin version (i.e., Imagine that the China is preparing for the outbreak...) respectively (see Appendix F for questionnaire).

All participants completed the time metaphors, perceived control measures, academic, medical, and investment risk-preferences measures. In addition, they completed one of the monetary gamble measures (gain or loss) and also one of the Asian disease problems (gain or loss). The Mandarin translation was identical to the English version except that the outcome values were in Yuan (¥).

Procedure

The procedure was identical to that used in Study 5 – Mandarin-speakers completed the questionnaire online by clicking on links to the study whereas English-speakers completed the questionnaire online in a laboratory setting.

4.2.3 Results

Post-hoc power analysis (Faul, et al., 2009) revealed that with a sample size of 205, effect size of $d = 0.52$, the power achieved to detect the difference in investment risk-taking was .96.

Cultural Differences in the Use of Time Metaphor

Participants' metaphorical representations of time were analysed as the proportion of ego-moving responses selected. In order to examine differences in ego-moving response between English and Mandarin-speakers, an independent-samples *t*-test was conducted. Given a violation of Levene's test for homogeneity of variances, $F(1, 203) = 581.59, p < .001$, a *t*-test not assuming homogeneous variances was calculated. English speakers selected significantly more ego-moving responses ($M = .68, SD = .28$) than did Mandarin-speakers ($M = .004, SD = .03$), $t(100.76) = 23.54, p < .001, d = 3.44$.

Perceived Control

Participants' scores on the Internality, Powerful others, and Chance subscales of the IPC measure were entered into a multivariate ANOVA with culture as a between-participants factor. There was a significant multivariate effect of culture, $F(3, 201) = 9.24, p < .001, \eta^2_p = .12$. Moreover, univariate tests for each subscale indicated that Mandarin-speakers made stronger attributions to Chance [$F(1, 203) = 10.07, p = .002, \eta^2_p = .05$] and to Powerful others [$F(1, 203) = 16.19, p < .001, \eta^2_p = .07$] but less so to Internal factors, $F(1, 203) = 8.11, p = .005, \eta^2_p = .04$ compared to English-speakers. See Table 4.6 for means and standard deviations of IPC ratings.

Table 4.6. Mean ratings of IPC sub-scales as a function of culture in Study 6A

Culture	Internality <i>M (SD)</i>	Powerful Others <i>M (SD)</i>	Chance <i>M (SD)</i>
English (<i>n</i> = 100)	32.47 (5.51)	19.36 (7.56)	20.29 (7.79)
Mandarin (<i>n</i> = 105)	30.28 (5.52)	23.19 (6.01)	23.47 (6.51)

Note: Standard deviations are shown in parentheses. Higher scores indicate greater control.

Calculation of the Risk Preference Index

A Risk Preference (RP) Index was assigned to each respondent based on his or her choices in each set of questions (Hsee & Weber, 1999). In the monetary gambles domain, the RP Index can range from 1 (most risk-averse) to 8 (most risk-seeking). If a participant chose the sure option in all the seven questions, his/her RP Index was defined as 1 (most risk-averse). If he/her chose the risky option in all of the seven questions, the RP Index was defined as 8 (most risk-seeking). If a participant chose the risk option in Question 1 through Question $i-1$, and chose the sure option in Question i through Question 7, her RP index was defined as i . The reverse rule was applied to the loss condition. If participants' choice pattern across the questions was inconsistent (e.g. choosing a small sure gain over a risky gain but choosing the risky gain over a larger sure gain), their RP Index was categorized as missing value. The calculation method of RP Index for investment, academic and medicine domains was the same as in monetary gambles domain except in these three domains each set of question only has three questions, therefore the RP Index ranged only from 1 (most risk-averse) to 4 (most risk-seeking).

Perceived Control & Risk-preferences

Participants' scores on the risk preferences measure were entered into a multivariate ANOVA with culture as a between-participants factor. There was no significant multivariate effect of culture, $F(5, 58) = 1.108$, $p = .37$, $\eta^2_p = .087$. No significant effect emerged on any subscale [largest $F(1, 132) = 2.804$, $p = .10$, $\eta^2_p = .021$]. The means, standard deviations, and main effects are presented in Table 4.7 as a function of culture.

Table 4.7 Means, standard deviations, and main effects of risk preferences index by culture and risk-taking context in Study 6A

	English		Mandarin		Main effects	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	η^2_p
Monetary gamble						
Gain - Large	2.35	1.27	2.29	1.50	0.36	.00
Gain - Small	3.39	1.42	3.20	1.70	0.35	.00
Loss - Large	3.08	1.52	3.36	1.81	0.62	.01
Loss - small	3.37	1.39	3.61	1.42	0.70	.01
Investment	2.14	0.66	2.02	0.83	1.36	.01
Academic	1.63	0.66	1.76	0.69	1.91	.01
Medical	1.98	0.80	2.26	0.99	2.80	.02

Note: Higher risk preferences index indicates more risk-taking.

For the Asian disease framing question, the pattern of outcome obtained was consistent with the previous findings (Tversky & Kahneman, 1981) whereby people tend to be more risk averse when the choices involving gain but more risk taking when the choices involve losses. A chi-square test indicated that Mandarin-speakers were significantly more risk-taking when the choices were framed in losses [$\chi^2(1) = 8.76, p = .003$] by selecting more risky option compared to the English-speakers. However, there was no significant difference in the choice pattern between the two cultural groups when the choices were framed in a gain frame [$\chi^2(1) = 3.08, p = .079$]. See Table 4.8 for distribution of responses.

Table 4.8. The distribution of responses as a function of culture and problem framing for The Asian disease problem in Study 6A

	Positive frame		Negative frame	
	English	Mandarin	English	Mandarin
Sure option	44 (75.9%)	32 (60.4%)	18 (42.9%)	8 (15.4%)
Risky option	14 (24.1%)	21 (39.6%)	24 (57.1%)	44 (84.6%)

Relationships among Measures

It was hypothesized that risk preferences would be predicted by perceptions of control (i.e., the Internality subscale of the IPC relative to the Powerful others and Chance subscales). Perceptions of control were, in turn, hypothesized to be predicted by the use of ego-moving metaphors of time, which was expected to vary by culture.

In examining the evidence for these hypotheses, regression analysis was first carried out to see whether the use of ego-moving metaphors predicted general perceptions of control. The use of ego-moving metaphor was a significant predictor of general perceptions of control, $R^2 = .10$, $F(1, 203) = 23.40$, $p < .001$. Further regression analyses were carried out to test whether perceptions of control predicted risk preferences in any of the decision domains. The general perceptions of control was not a significant predictor in any decision domain [largest $F(1, 132) = 1.46$, $p = .230$]. See Table 4.9 for regression analyses output.

Table 4.9 *Results of regression analysis with general perception of control as a predictor of risk-preferences for Study 6A*

	<i>B</i>	<i>SE B</i>	β	R^2	<i>F</i>
Monetary gamble					
Gain - Large	0.01	0.02	0.04	.00	0.16
Gain - Small	0.00	0.02	0.02	.00	0.02
Loss - Large	-0.02	0.02	-0.11	.01	1.13
Loss - Small	-0.01	0.02	-0.05	.00	0.20
Investment	0.00	0.01	0.02	.00	0.05
Academic	-0.01	0.01	-0.07	.01	0.96
Medical	-0.01	0.01	-0.10	.01	1.46

Note. *B* = Unstandardized coefficient, *SE B* = standard error for the unstandardized beta, β = Standardized coefficient. * $p < .05$ ** $p < .01$. *** $p < .001$.

Although general perceptions of control was not a significant predictor on the positive framing Asian disease problem, $R^2 = .002$, $F(1, 109) = .224$, $p = .637$ it was a

significant predictor when the question was framed in a negative frame, $R^2 = .102$, $F(1, 92) = 10.483$, $p = .002$.

Turning to the hypothesis that culture and metaphorical representations of time would predict perceptions of control (and consequently risk preferences), there was little evidence to support this. As noted above, there were no cultural differences on any decision domains and participants' general perceptions of control were a weak predictor across all decision domains. See Appendix G for a complete correlation matrix.

4.2.4 Study 6B – Participants, Materials, and Procedure

Participants

The sample size was determined by referencing a related cross-cultural study (Hsee & Weber, 1999). With an effect size of $d = 0.52$, G*Power analysis (Faul, et al., 2009) showed that a sample size of at least 68 in each cultural group was required to reliably detect a difference in investment risk-taking with 0.85 power. Two hundred and thirteen participants participated in this study online. Participants were recruited by posting study links on various psychological and non-psychological research websites and social-networking platforms (see Appendix A – Part I for online recruitment sources). Participants were offered a chance to enter a prize lucky draw (£50 cash voucher for English-speakers; RM50 for Mandarin-speakers) for completing the questionnaire online.

Of the two hundred and thirteen responses, 162 were valid following the inclusion criteria (exclusion rate = 23.94%) (32 responses were incomplete, 18 were non-native English or Mandarin speakers, and 1 below 18 years-old) (109 females, $M_{\text{age}} = 22.42$, $SD = 5.67$) including 88 English-speakers and 74 Mandarin-speakers. The English-speaking sample were students from University of Plymouth whilst the Mandarin-speakers were Mandarin

speaking individuals with Chinese cultural backgrounds residing in Malaysia. Most of the native English-speakers were born in the U.K (97.73%) apart from one born in New Zealand and one in Canada. All the native Mandarin-speakers were born in Malaysia.

Procedure

Time Metaphors: Participants completed the five-item version of the time metaphor measure as describe in Study 5. Temporal orientation was not measured in this study.

Perceived Control: Participants completed the Internality, Powerful others, and Chance (IPC) scale (Levenson, 1981). Cronbach's alpha was 0.56 for Internality, 0.75 for Chance, and 0.72 for Powerful others.

Risk-Taking: Participants completed the 30-item risk taking component of the revised Domain Specific Risk Taking Attitude (DOSPERT) scale (Blais & Weber, 2006) intended to measure their risk-taking tendencies across a variety of domains: Social (e.g., admitting that your tastes are different from those of a friend), Financial-gambling (e.g., betting a day's income at the horse races), Financial-investment (e.g. Investing 5% of your annual income in a very speculative stock), Health/safety (e.g., drinking heavily at a social function), Recreational (e.g., going down a ski run that is beyond your ability), and Ethical (e.g., taking some questionable deductions on your income tax return). Participants rated their likelihood of engaging in the activity on a 7-point scale ranged from 1 (*extremely unlikely*) to 7 (*extremely likely*). Participants' risk-taking behaviour for each risk domain was produced by adding up the six responses on the corresponding domain. A higher value indicates greater risk-taking behaviour. Mandarin participants completed the Chinese version of DOSPERT. The 30-item scale displayed good internal consistency (Cronbach's α

= .80). Subscales corresponding to individual domains had mixed consistency (social $\alpha = .64$; ethical $\alpha = .65$; financial $\alpha = .73$; health/safety $\alpha = .57$; recreational $\alpha = .73$).

4.2.5 Study 6B: Results

Post-hoc power analysis (Faul, et al., 2009) revealed that with a sample size of 162, effect size of $d = 0.52$, the power achieved to detect the difference in investment risk-taking was .91.

Cultural Differences in the Use of Time Metaphor

Participants' metaphorical representations of time were analysed as the proportion of ego-moving responses selected. Given a violation of Levene's test for homogeneity of variances, $F(1, 160) = 123.87, p < .001$, a t -test not assuming homogeneous variances was calculated. An independent-samples t -test revealed that English-speakers selected significantly more ego-moving responses ($M = .60, SD = .30$) than Mandarin-speakers ($M = .14, SD = .22$), $t(157.26) = 11.42, p < .001, d = 1.73$.

Perceived Control & Risk-Taking

Participants' scores on the Internality, Powerful others, and Chance subscales of the IPC measure were entered into a multivariate ANOVA with culture as a between-participants factor. There was a significant multivariate effect of culture, $F(3,157) = 3.62, p = .015, \eta^2_p = .065$. Univariate tests for each of the three subscales indicated that English-speakers made stronger attributions to Internal factors ($F(1, 160) = 11.64, p < .001, \eta^2_p = .07$), but not to Chance ($F(1, 159) = .17, p = .681, \eta^2_p = .001$) or to Powerful others ($F(1, 160) = .37,$

$p = .545$, $\eta^2_p = .002$) compared to Mandarin-speakers. See Table 4.10 for means and standard deviations of IPC ratings.

Table 4.10. Mean ratings of IPC sub-scales as a function of culture in Study 6B

Culture	Internality <i>M (SD)</i>	Powerful Others <i>M (SD)</i>	Chance <i>M (SD)</i>
English ($n = 87$)	29.32 (5.21)	22.01 (7.21)	22.80 (6.38)
Mandarin ($n = 74$)	32.19 (5.43)	21.32 (7.31)	22.32 (8.01)

Note: Standard deviations are shown in parentheses. Higher scores indicate greater control.

Participants' self-reported risk-taking behaviour for each risk domain was computed separately. These scores were then entered into a multivariate ANOVA with culture as a between-participant factor. There was a significant multivariate effect of culture, $F(5,156) = 11.60$, $p < .001$, $\eta^2_p = .27$. Univariate tests for each of the risk-taking domains indicated that Mandarin-speakers were more risk taking only on financial items [$F(1, 160) = 40.36$, $p < .001$, $\eta^2_p = .20$] compared to English-speakers. There was no difference between English and Mandarin-speakers' behaviour on social, health, recreational, and ethical items (all F 's < 3.31 , p 's $> .07$) (see Table 4.11 for means, standard deviations, and main effects). Further analysis showed that Mandarin-speakers' greater risk-taking on the financial domain (vs. English-speakers) was due to their higher risk taking behaviour on the investment subscale, $F(1, 160) = 108.35$, $p < .001$, $\eta^2_p = .40$, but not on the gambling subscale, $F(1, 160) = .007$, $p = .931$, $\eta^2_p < .001$.

Table 4.11 Means, standard deviations, and main effects of self-reported risk-taking behaviours as a function of culture and DOSPERT subscale in Study 6B

	English (<i>n</i> = 88)		Mandarin (<i>n</i> = 74)		Main effects	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	η^2_p
Financial	13.76	6.26	19.70	5.52	40.36 ***	.20
Investment	5.36	4.13	5.31	3.57	108.35 ***	.40
Gambling	8.40	3.65	14.39	3.66	0.01	.00
Social	31.66	5.40	30.68	5.01	1.43	.01
Health	21.36	6.45	19.45	6.95	3.31	.02
Recreational	23.36	9.16	25.15	6.64	0.17	.01
Ethical	14.19	5.57	15.12	5.95	0.31	.01

Note: Risk-taking behaviour was rated using a scale ranging from 1 to 7. Higher scores indicate greater risk-taking behaviour.

Relationships among Measures

It was hypothesized that risk-taking behaviour would be predicted by general perceptions of control (i.e., the Internality subscale of the IPC relative to the Powerful other and Chance subscales). Perceptions of control were, in turn, hypothesized to be predicted by the use of ego-moving metaphors of time, which we expected to vary by culture.

In examining the evidence for these hypotheses, regression analyses were first carried out to see whether general perception of control predicted risk-taking behaviour in any of the decision domains. The general perceptions of control was a significant predictor on the social domain [$R^2 = .030$, $F(1, 160) = 5.00$, $p = .027$] and ethical domain [$R^2 = .093$, $F(1, 160) = 16.45$, $p < .001$]; but not a significant predictor on financial decision, health, and recreational decision. See Table 4.12 for regression analyses output.

Table 4.12 Results of regression analysis with general perception of control as a predictor of risk-taking behaviours for Study 6B

	<i>B</i>	<i>SE B</i>	β	R^2	<i>F</i>
Financial	-0.04	0.05	-0.07	.00	0.74
Social	0.09	0.04	0.17	.03	5.00 *
Health	-0.03	0.05	-0.04	.00	0.29
Recreational	0.05	0.06	0.06	.00	0.59
Ethical	-0.17	0.04	-0.31	.09	16.45 ***

Note. *B* = Unstandardized coefficient, *SE B* = standard error for the unstandardized beta, β = Standardized coefficient. * $p < .05$ ** $p < .01$. *** $p < .001$.

Secondly, a series of regression analyses were carried out to test whether the use of ego-moving metaphor was a significant predictor of risk-taking in any of the decision domains. The use of ego-moving metaphor was only significantly predicted financial risk-taking, $R^2 = .044$, $F(1, 160) = 7.37$, $p = .007$ but not any other risk-taking decisions [largest $F(1, 160) = 2.27$, $p = .134$]. See Table 4.13 for regression analyses output.

Table 4.13 Results of regression analysis with the ego-moving response as a predictor of risk-taking behaviours for Study 6B

	<i>B</i>	<i>SE B</i>	β	R^2	<i>F</i>
Financial	-3.96	1.46	-0.21	.04	7.37 **
Social	1.23	1.18	0.08	.01	1.09
Health	2.27	1.51	0.12	.01	2.27
Recreational	-1.79	1.83	-0.08	.96	0.96
Ethical	-0.26	1.30	-0.02	.00	0.04

Note. *B* = Unstandardized coefficient, *SE B* = standard error for the unstandardized beta, β = Standardized coefficient. * $p < .05$ ** $p < .01$. *** $p < .001$.

Further regression analysis showed that the use of ego-moving metaphor was not a significant predictor of general perceptions of control, $R^2 = .009$, $F(1, 160) = 1.492$, $p = .224$. Moreover, computed correlations among measures of metaphorical representations, perceived control, and risk-taking showed that there was little evidence of the effects of

culture on each of these measures being dependent on each other, as the individual measures did not correlate with each other (See Appendix H for a complete correlation matrix).

4.2.6 Discussion of Study 6A & 6B

Studies 6A and 6B were intended to explore the relationship between the use of time metaphor, perceived control, and risk-taking tendency (i.e., risk preferences and risk-taking behaviour). Mandarin-speakers once again showed a tendency to adopt time-moving metaphor whereas English-speakers tended to take an ego-moving metaphor.

In terms of risk preferences, there were no cultural differences detected between English and Mandarin-speakers across all decision domains. This finding is consistent with previous studies which found no cross-cultural risk preferences between Chinese and American students (Weber & Hsee, 1998). However, previous finding of cultural differences in risk-taking behaviour (Hsee & Weber, 1999) was also observed in Study 6B, with Mandarin-speakers reporting higher risk-taking tendency compared to English-speakers. This finding supported the competing hypothesis. Mandarin-speakers reporting greater willingness to take risks in making financial decisions compared to English-speakers. It is worth noting that the difference was due to higher investment risk-taking but not on monetary gambles.

The findings of Mandarin-speakers' greater risk-taking in the investment domain is consistent with the cross-cultural risk-taking studies (Botempo, Bottom, & Weber, 1997; Weber & Hsee, 1998). Various possibilities have been proposed to account for this observation such as the availability of social network (i.e., cushion hypothesis: Weber & Hsee, 1998; framing effect: Wang & Fischbeck, 2004; probability thinking: Wright & Phillips,

1980; cultural wisdom: Weber, Hsee, & Sokolowska, 1998). As described earlier, the cushion hypothesis proposed by Weber and Hsee (1998) suggested the support from wider social network in Asian countries act as a cushion to mitigate the risk of adverse decisions.

Although one could argue wouldn't the social cushion to be associated with greater risk-taking in gambling domain as well. Despite speculative in nature, it is possible that gambling carries a greater social taboo as it is generally not socially acceptable to seek help from family and friends after gambling losses whereas losses due to investment might be a more probable reason for seeking help.

On the other hand, it is also possible that Mandarin-speakers are more risk-taking in investment due to framing effect. Previous study showed that people make different decisions contingent upon whether the outcome was framed as either investment or gambling (Deck et al., 2013), an indication that people's decisions are affected by how a financial problem is framed. Another supportive finding of East Asians being more susceptible to framing effects comes from the observation that Mandarin-speakers were more risk-taking when the Asian disease problem was framed in a negative frame. It appears Mandarin-speakers were more risk-taking in the prospect of losses. Taken together, one could postulate that Mandarin-speakers more affected by choice outcome is likely to be related to their largely holistic nature of attentional strategy (Masuda & Nisbett, 2001) which drive them into taking more account of the contextual information and consequently more restricted by it. However, the investment and gambling decision problems used to investigate risk-taking in this study were different choice problems and therefore it is difficult to draw a firm conclusion based on that.

It was hypothesized that the time metaphor adopted would play a mediator role between culture and risk-taking tendency. However, the results showed little supportive

evidence of a relationship between the use of time metaphor and risk-taking tendency. Firstly, the use of ego-moving metaphor was found to relate only to one of the decision domains (i.e., financial risk-taking). Secondly, general perceptions of control were not a significant predictor of the use of ego-moving metaphor. Correlational analysis revealed there was only very weak or near non-existent relationship between the use of time metaphor and perception of control and therefore there was little evidence of the use of time metaphor, perception of control, and risk-taking dependent on each other.

4.3 Cross-Study Analyses

Cultural differences in different aspects of time perception were observed in the three studies reported in this chapter. To obtain a more precise estimate of the size of these effects, analyses were carried out on the combined datasets.

Cultural Differences in the Use of Time Metaphor

Participants' ego-moving scores from Study 5, 6A, and 6B were combined and entered into a Univariate ANOVA test with culture (English vs. Mandarin) and the study the data was recruited from (Study 5 vs. 6A vs. 6B) as between-participant factors. Analysis showed that English-speakers ($M = 0.66$, $SD = 0.29$) had a higher ego-moving score compared to Mandarin-speakers ($M = 0.04$, $SD = 0.13$), $F(1, 544) = 1023.15$, $p < .001$, $\eta^2_p = .653$. This difference was qualified by a significant culture by study interaction [$F(2, 544) = 13.788$, $p < .001$, $\eta^2_p = .048$], such that English-speakers had lower ego-moving scores in Study 6B compared to those in Study 5 and 6A whereas Mandarin-speakers had a higher ego-moving scores in Study 6B compared to those in Study 5 and 6A. Nonetheless there was

no significant main effect of study, $F(2, 544) = 0.86, p = .424, \eta^2_p = .003$. See Figure 4.2 for participants' ego-moving responses by study and culture.



Figure 4.2 Participants' ego-moving responses by study and culture.

Cultural Differences in Perception of Control

Because the IPC scale was included in multiple studies, it makes sense to report the results of analyses that combine the datasets to produce more precise estimates of effect sizes. A series of two-way ANOVA tests were conducted to examine the effect of study and culture on internality, powerful others, and chance sub-scales with study and culture as between-participants factors. There was a significant main effect of culture on the internality score, $F(1, 544) = 11.023, p = 0.001, \eta^2_p = .02$ such that English-speakers ($M = 31.82, SD = 5.57$) scored higher compared to Mandarin-speakers ($M = 30.28, SD = 5.64$). This difference was moderated by study, $F(2, 544) = 3.953, p = 0.02, \eta^2_p = .014$ with English-speakers scoring significantly higher compared to Mandarin-speakers in Study 6A and 6B but

not in Study 5. Nonetheless there was no significant main effect of study, $F(2, 544) = 0.619$, $p = .539$, $\eta^2_p = .002$.

There was also a significant main effect of culture on scores on the Powerful-others subscale, $F(1, 544) = 10.832$, $p = 0.001$, $\eta^2_p = .02$ such that Mandarin-speakers ($M = 22.46$, $SD = 7.23$) scored higher compared to English-speakers ($M = 20.33$, $SD = 7.12$). This difference was not moderated by study, $F(2, 544) = 2.396$, $p = 0.092$, $\eta^2_p = .009$; nor was there a significant main effect of study, $F(2, 544) = .198$, $p = 0.821$, $\eta^2_p = .001$.

Finally, there was a significant main effect of culture on the Chance sub-scale, $F(1, 544) = 7.330$, $p = 0.007$, $\eta^2_p = .013$ such that Mandarin-speakers ($M = 22.68$, $SD = 6.44$) scored higher compared to English-speakers ($M = 20.98$, $SD = 7.54$). This difference was not moderated by study, $F(2, 544) = 1.765$, $p = .172$, $\eta^2_p = .006$; nor was there a main effect of study, $F(2, 544) = 1.416$, $p = 0.244$, $\eta^2_p = .005$.

4.3.1 Discussion of Cross-study Analyses

The responses from Study 5, 6A, and 6B were combined to perform cross-study analyses. The results confirmed that English-speakers were more likely to use ego-moving metaphors whereas Mandarin-speakers were more likely to use time-moving metaphors. This appears to be a strong disposition with the distinctions being observed in all the studies conducted.

Apart from time metaphor responses, the responses on IPC scale from Study 5, 6A, and 6B were combined to produce a more precise picture of the cross-cultural differences in perception of control. English-speakers were found more likely to attribute events to internal forces whereas Mandarin-speakers were more likely to attribute events to chance and powerful-others. Taken together, the findings were consistent with suggestions in the

literature that East Asians have greater external locus of control whereas Western individuals have greater internal locus of control (Sastry & Ross, 1998).

4.4 Discussion

The studies in this chapter aimed to investigate cultural differences in time metaphors and their potential role as a mediator between culture and downstream judgements and decisions. Study 5 explored the mediating role time metaphor plays between culture and unrealistic optimism; Study 6A and 6B examined the possibility of the use of time metaphors as a mediator between culture and risk preferences and risk-taking behaviour respectively. In addition, they also attempted to replicate cultural differences in time perception (i.e., temporal orientation in Study 5 and the use of time metaphor in Study 5, 6A, & 6B).

Combining the results from the three studies, there is strong evidence of cultural differences in the use of time metaphor with English-speakers more likely to take an ego-moving metaphor whereas Mandarin-speakers were more likely to take a time-moving metaphor. The findings of this study converged and extended cross-cultural literature on the use of time metaphor, replicated the findings of a diverse use of time metaphor as a function of cultural background with native Mandarin-speakers from East Asian countries (e.g., China, Malaysia, Singapore, and Taiwan) and native English-speakers from the U.K. as participants.

As discussed in Study 5, one might question whether the difference in the use of time metaphor truly reflects the conceptual difference in time perception or is rather a result of the linguistic framework (due to the involvement of two different languages in the time metaphor ambiguous questions). However, in all the studies reported here,

participant's responses on the time metaphor ambiguous questions were classified as ego-moving or time-moving, and the proportion of ego-moving responses was calculated for each participant. Some of the questions were spatial in nature as space and time have close correspondence in language (e.g., Gentner et al., 2002). As an abstract concept, time can be described and understood by referring to a more tangible domain such as space. The expressions of "time is like a river, you can never step into the same river twice" by the Greek philosopher Heraclitus, is an example of mapping time onto a more familiar domain, space. However, whether time-space mapping is habitual psychological concepts is still an open question as language construct of metaphorical system does not necessarily imply real psychological correspondence.

The use of several time metaphor ambiguous questions also aimed to minimize the possibility of the difference in response being due to linguistic framework difference in the interpretation of the questions. Careful translation process including using the method of back translation (Brislin, 1970) with the involvement of two bilingual translators in order to ensure the intended meaning was retained and to minimize the possibility of bias. However, as demonstrated in Lai and Boroditsky's (2013) study which compared the use of ego-moving metaphor among monolinguals, English-Mandarin bilinguals, and Mandarin monolinguals by varying the languages used in the time metaphor questions (i.e., English versus Mandarin), English-Mandarin bilinguals still showed greater tendency to adopt ego-moving metaphor when the time metaphor questions were presented in English.

However, it is worth noting that, the interpretation of the finding should be whether an individual is "more ego-moving" or "more time-moving". Although consistent cultural differences were found in the use of temporal metaphors, the metaphor adopted by any given individual is not a static disposition, but is instead dynamic and may shift in response

to situational or contextual factors (Gentner et al., 2002). The same applies to individual's psychological distance to the past or future as psychological distance can be varied as a function of temporal direction and direction of spatial movement (e.g., Caruso et al., 2013).

The second aspect of time of interest is the primary temporal region individuals from East and West attend to (i.e., past versus future). The response on psychological distance measure in Study 5 indicated that English-speakers rated a day one month in the future as subjectively closer than a day one month in the past. This is consistent with the study hypothesis in which Western individuals were expected to have a strong future orientation by attending more to the future (versus past). However, Mandarin-speakers rated a day one month in the past and a day one month in the future as equidistant. This is contrary to the findings of previous studies showing a stronger past orientation by East Asians (e.g., Ji et al., 2009) but is nevertheless consistent with the findings of Study 2 where they rated a target event (i.e., Chinese New Year Reunion dinner) to be equidistant (imagination vs. memory).

An explanation for English-speakers' greater future orientation is their societies' greater emphasis on sense of agency. The future is where we are heading, plans and executions are needed in order to put dreams into action and live a fulfilling life. This line of thinking is consistent with their greater sense of independent self - emphasis on realizing one's internal attributes, goal, and one's internal abilities, thoughts and feelings (Markus & Kitayama, 1991). Their tendency of placing more emphasis on forthcoming is functional as the past is gone and future is where desires and dreams can be put into action. This line of thinking also implied greater sense of personal control which is compatible with the greater internal attributions Western individuals tend to make. The use of IPC scale in the present research confirmed this by replicating the findings of greater internal sense of control among English-speakers.

Contrary to the study hypothesis in which Mandarin-speakers were expected to feel subjectively closer to the past, a day one month in the past and future was of equidistant to Mandarin-speakers. As defined earlier, temporal orientation refers to the primary temporal region to which an individual (Park et al, 2006) or the habitual temporal region an individual emphasizes, which could be reflected in the choices that we make (Zimbardo & Boyd, 1999). The used of psychological distance as a measure of temporal orientation is by adapting and modifying the measure used in a previous similar study (Ji et. al., 2009). However, the definitions of temporal orientation afforded broad interpretation which implied that other measures might be possible as well (e.g., habitual thinking or choices that people make in relation to a temporal region).

Turning back to the main purpose of studies presented in this study, to explore the possible downstream effects on judgement and decisions by the diverse use of time metaphor among English and Mandarin-speakers. It was hypothesized that individual's judgment or decisions (i.e., unrealistic optimism, risk preferences, and risk-taking behaviour) would be predicted by perception of control which, in turn, also hypothesized to be predicted by the use of metaphorical representation of time which was expected to vary by culture. However, despite linguistic framework interpretation suggestion (e.g., McGlone & Pfiester, 2009) and the implications of previous time-metaphor related findings (e.g., Lee & Ji, 2014; Ruscher, 2011), the results of the three studies suggest there is relatively little relationship between the use of time metaphor and perceived control. There was only very weak or near non-existent relationship between the use of time metaphor and perception of control. Perception of control was found not to be a significant predictor of optimism in Study 5, risk preferences in Study 6A and only on limited decision domains in risk-taking behaviour (Study 6B). Moreover, risk-taking tendency appeared to be domain specific, as

supported by the observation that Mandarin-speakers were more risk-taking behavior in financial domain but not in other decision domains. Further investigation into possible downstream effect of the use of time metaphor on individual's unrealistic optimism and risk-taking tendency also revealed little evidence of the influence of time metaphor.

The results of the studies suggest little evidence of the influence of time metaphor on individual's downstream judgement and decision, specifically optimism bias and risk-taking tendency. A possible explanation for this is, metaphor might be only a conceptual, theoretical, or linguistic mapping rather than a real psychological construct. Although previous research suggested otherwise (Gentner et al., 2002). Or perhaps it could be one's change in habitual disposition (e.g., for example through involvement of physical movement) that could exert influence on one's temporary judgement or decisions. These are speculative in nature nevertheless they are open questions awaiting answers.

In summary, the studies reported here provide compelling evidence of cultural differences in perceptions both of time and of causality, but yielded little evidence that such differences produce meaningful differences in downstream judgments and decisions.

Chapter 5 - General Discussion

5.1 Culture and Time Perception

Across a series of studies, this thesis investigated two aspects of time perception, temporal orientation and the use of time metaphors, and their potential downstream influences on mental representations and decisions. Study 1 investigated whether the cultural differences reported in the existing literature could be replicated among English- and Mandarin-speakers. Study 2 and Study 3 examined whether phenomenological characteristics of mental representation vary in accordance with psychological distance. Study 4 investigated the relationship between culture and a different measure of temporal orientation, namely nostalgic tendency. In addition, the relationship between nostalgia and nostalgic item valuation was also addressed in this study. Subsequent studies explored whether the use of different time metaphors is related to perceived personal control, and also addressed the possibility that the use of time metaphors influences optimism biases (Study 5) or risk-taking tendency (Study 6A & 6B) as a function of perceived personal control.

To give a general overview of present thesis' findings on the relationship between culture and time perception, the results of several studies have been combined and integrated in order to provide an overview of results on two key measures, namely temporal orientation and the use of time metaphors. It aims to answer the question of whether time perceptions differ between English and Mandarin-speakers by using participants' responses to the time-perception measures, namely the temporal orientation questions (i.e., psychological distance) and the time metaphor question. All the effect sizes were calculated using means and standard deviations. The average effect size of each study (i.e., average d

within study) was computed using the average of different measures within the study whereas the overall effect size (“average weighted effect size”) was computed by using study as a basis unit of measure. It is also important to note that the marking of effect size indicates the extent to which they fit the predictions of this thesis.

5.1.1 Temporal Orientation

With reference to the claims in the existing literature that Westerners and East Asians prioritise different temporal regions, with Westerners emphasizing the future (Caruso et al., 2008; Caruso, 2010; Caruso et al., 2013; Guo et al., 2012; Ji et al., 2009; Van Boven & Ashworth, 2007; Van Boven et al., 2010) whereas East Asians prioritise the past (Guo et al., 2012; Ji et al., 2009), this thesis results show a small effect size in relation to investigation of such claims. The summary shows that across the three studies, the average weighted effect size is $d = 0.15$ for both between-cultures and within-culture comparisons. See Table I1 in Appendix I for effect sizes across studies based on between-cultures comparison and within-culture comparison of participants’ responses to the psychological distance questions.

Taken together, it would seem that English-speakers have a stronger future orientation and a weaker past orientation, whereas Mandarin-speakers are neither past- nor future-oriented. In terms of cross-cultural comparisons, Mandarin-speakers were more past-oriented (vs. English-speakers) whereas English-speakers were more future-oriented (vs. Mandarin-speakers). This indicates that English-speakers’ observed tendencies are in-line with previous related works (Caruso et al., 2008; Caruso et al., 2013; Guo et al., 2012; Ji et al., 2009) whereas Mandarin-speakers’ tendencies are only partially consistent with

previous related works (Guo et al., 2012; Ji et al., 2009). This put forward a few considerations and suggestions.

The findings of cultural differences in temporal orientation between English and Mandarin-speakers in this thesis had an average smaller effect size compared to previous similar studies (Caruso et al., 2013; Ji et al., 2009) especially in relation to the Mandarin-speakers. Previous findings on temporal orientation - including those from cross-cultural comparison paradigms (Ji et al., 2009 – Chinese vs. Euro-Canadians) and from non-cross cultural paradigms (Caruso et al., 2013 - Western participants) - both had a medium effect size (Cohen's d range from .45 to .68) by using similar testing questions as used in the present thesis.

A possible explanation for a smaller effect size obtained in this thesis is that, the above mentioned previous related studies adopted different target events in the psychological distance measure compared to this thesis. Previous research has shown that emotional valence (positive vs. negative) of an event affects the psychological distance people feel toward the event in question (Ross & Wilson, 2002). Therefore, it is possible that the use of different target events might account for the difference in outcome because participants' psychological distance to an event is likely to be guided by the nature or type of the event. For instance, although emotional valence was not measured in Ji et al. (2009) which showed cultural differences in psychological distance, it is reasonable to assume that the emotional valence of the target event used (i.e., exam) was less positive than the target events used in this thesis (e.g., festive celebrations²²). The use of different target events

²² The average emotional valence ratings (imagination and memory) in Study 2: English-speakers ($M = 6.04$; $SD = 1.14$); Mandarin-speakers ($M = 5.87$; $SD = 1.08$). Rating scale used: 1 = *very negative*; 7 = *very positive*.

should trigger different types of emotions during mental simulation and thus affects the psychological distance participants feel.

Based on CLT (Trope & Liberman, 2010) and temporal value asymmetry findings (Caruso et al., 2008; Caruso et al., 2013; Guo et al., 2012; Van Boven & Ashworth, 2007; Van Boven et al., 2010), it was predicted that individuals' propensity to be oriented toward a temporal region might be reflected in their mental representations of specific events. Specifically, English-speakers who are more future (vs. past) oriented should feel closer to an event during imagination and thus their mental representation of a future event (vs. an identical past event) should be filled with greater phenomenological characteristics (e.g., emotional intensity, sensorial details, spatial details). Likewise, the same should be observed for Mandarin-speakers' representations of past events given their greater past (vs. future) orientation.

Overall, there are observable cultural variations in mental representation as a function of temporal orientation, and this is especially prominent among English-speakers. Study 2 reaffirmed English-speakers' stronger future orientation, showing that English-speakers' prospective mental simulations of an event were also filled with greater phenomenological characteristics compared to their retrospective mental simulations. Such findings are in line with their feelings of being psychologically closer to the event prospectively (vs. retrospectively) and also to the future in general as observed in Study 1.

On the other hand, Mandarin-speakers reported mental representations that did not differ as a function of whether they were imagining or recalling. This applies to their emotional intensity, visual details, sensorial details of sound and smells/tastes, and spatial information. This finding is in line with their equidistant psychological distance ratings to the event prospectively and retrospectively.

Subsequently, by contrasting mental representations of events located temporally closer vs. more distant, Study 3 indicated that the phenomenological characteristics of our mental representations vary as a function of both objective temporal distance and psychological distance. Study 3 provided converging evidence that psychological distance is an important driving variable that influences mental representations. Both English and Mandarin-speakers' mental representations were found differ in accordance to the psychological distance (and also objective distance) of the event in concern. This finding is also consistent with previous research that mental representation of objectively more recent events tended to contain greater phenomenological characteristics (e.g., sensorial and contextual information) compared to those that are more distant (D'Argembeau & Van der Linde, 2004; Johnson et al., 1988) and is also in line with the predictions of CLT (Trope & Liberman, 2010).

The sole evidence of Mandarin-speakers' greater past-orientation in this thesis is their relatively higher levels of self-reported nostalgic tendencies. A possible reason for this is that East Asian societies are characterised by greater emphasis on tradition and heritage (e.g., worshipping of ancestors, strong family relations), created by a social environment or cultural norm that prompts or triggers past-related thinking. Thus, they experience more episodes of nostalgia and past-related emotions. Related support for this is that Chinese individuals tended to draw on past personal events for self-reflection purposes (Wang & Conway, 2004) and they considered past situations to be more relevant in understanding a current problem and remembered them in greater detail (vs. Euro-Canadians) (Ji et al., 2009). Therefore, environmental and cultural factors might be related to their relatively higher nostalgic tendency compared to English-speakers.

The contrary patterns of results obtained by using psychological distance measure and nostalgic tendency suggest that these two are likely measuring different aspects. Psychological distance measures the extent to which people feel psychologically closer/distant to an event or a time point, which is largely “affective” in nature as opposed to nostalgic tendency which measures both “affective” and “cognitive” dimensions in relation to the past. This is because the SNS measures the frequency of experiencing nostalgic tendency, personal relevance of nostalgia (i.e., importance, value, and significance), and the proclivity of experiencing nostalgia episodes. Whilst “thinking about the past” is considered to be one of the main features of being past-oriented (e.g., Guo et al., 2012, Ji et al., 2009, Maddux & Yuki, 2006), the psychological distance question does not seem to capture such a tendency. Future research should aim to fill this gap, by clarifying and identifying temporal orientation tendency and measurement respectively.

Importantly, the specific mechanism underlying individuals’ temporal orientation is unclear. Whilst a few studies (Caruso et al., 2008; Caruso, 2010; Van Boven & Ashworth, 2007) attributed Western individuals’ greater emphasis on the future to their stronger emotional feelings or more extensive (e.g., vivid) mental simulation (Van Boven & Ashworth, 2007) of a future event, Guo et al. (2012) proposed that it is associated with the extent to which people focus or think about a temporal region (i.e., temporal focus). However, emotional intensity did not predict the psychological distance ratings in Study 2 and Study 3²³. This is not the focus of this thesis, but it is nevertheless an important question awaiting clarification.

²³ Emotional intensity did not predict psychological distance felt toward event in question (based on linear regressions: Study 2: all β 's < -.20, p 's > .10; Study 3: all β 's < -.18, p 's > .07), nor did it mediated the effect of culture on psychological distance (Preacher & Hayes, 2008; based on 10,000 bootstrapping - Study 2: all β 's < -.10; Study 3: all β 's < .08, all 95% BCaCI contain zero).

An important question arises from the consistent observation of cultural differences in the dominant use of visual perspective, specifically whether the use of first-person and third-person perspectives serves similar psychological functions for people from different cultural groups. As indicated earlier in Chapter 3, previous visual perspective studies recruiting Western participants suggest various factors that could influence the type of visual perspective one uses (e.g., personal change – Libby & Eibach, 2002; emotionality – Berntsen & Rubin, 2000, authenticity of memory – Justice et al., 2013). It remains unknown how these factors would interact with the use of third-person perspective among East Asians. Nevertheless, the findings in this thesis is consistent with Cohen and Gunz’s (2002) suggestion that the use of third-person perspective among East Asians is more prevalent in social settings.

Overall, there is observation of cultural differences on temporal orientation and mental representation between English-speakers and Mandarin-speakers. The changes in phenomenological characteristics of mental representation that individuals form appear to vary in accordance to the temporal region they primarily attend to, but this is only applicable to English-speakers. Mandarin-speakers seem to be neither future nor past oriented which is confirmed by their broadly similar past and future mental imagery.

5.1.2 The Use of Time Metaphor

The second aspect of time perception that was of interest in this thesis is the use of time metaphors. Overall, this thesis’ results on the use of time metaphors are consistent with a previous related work (Lai & Boroditsky, 2013), showing that the ego-moving metaphors are more frequently used among English-speakers whereas the time-moving metaphors are more common among Mandarin-speakers. The result of this thesis shows

that there is supportive evidence of cultural variations in the use of time metaphor, with a mean effect size of $d = 2.67$ when averaged across four between-cultures comparisons (see Table I2 in Appendix I for effect sizes across studies).

The linguistic frameworks of two common temporal metaphors, namely ego- and time-moving metaphors, were suggested to imply different sources of agency about the event in question by attributing the source of change to different entities (McGlone & Pfiester, 2009). However, despite predictions based on linguistic framework interpretation (McGlone & Pfiester, 2009), the use of time metaphor was found to have little relationship with perceived personal control (Study 5, 6A & 6B). It was predicted that the use of ego- versus time-moving metaphors would influence optimism bias and risk-taking through their effects on perceived personal control. However, there was little evidence of an association between the use of time metaphors and perceived personal control. Moreover, there was also little evidence of an impact of the use of time metaphors on one's tendency to be optimistic toward the future (Study 5) or on one's risk-taking tendency (Study 6A & 6B).

It has been assumed that the use of time metaphors is related to different levels of perceived personal control (McGlone & Pfiester, 2009), with the use of ego-moving metaphor relatively more advantageous for control (vs. time-moving metaphor). This thesis tested such proposition by looking at the correlations between self-reported measures of the use of time metaphor and perceived personal control. However, previous research suggesting an association (e.g., Ruscher, 2011) has not determined the direction of causality and therefore future research might investigate it from a different angle. An alternative means of investigating this relationship is to see whether variations in agentic control will result in a tendency to engage in one metaphorical time representation over another. For example, it may be informative to manipulate the agentic control one feels to see whether

enhancement or deprivation of agentic control will prompt the use of one perspective over the other. If the feeling of being in control is a driving motivation behind the metaphorical representation of time, an individual who is primed with feeling greater control (vs. feeling relatively less in control) might be more likely to use ego-moving metaphor. Conversely, an individual who feels relatively less in control might be more likely to take time-moving metaphor.

In the analysis of perceived personal control, the present study focuses on active personal control by using Rotter's IE scale (Rotter, 1966) and Levenson's IPC scale (Levenson, 1981). However, there are other types of perceived personal control or agency constructs which might be related. Different conceptions of personal control or agency vary in regard to whether their central component ideas are more or less relevant to a particular cultural context. For instance, two-process models have highlighted primary control versus secondary control (Rothbaum, et al., 1982) which is relatively more applicable to Western and Eastern societies respectively. Primary control refers to the dominant type of control commonly observed among Western culture (e.g., Americans) in which one exerts control by influencing one's situation through active measures. In contrast, secondary control which is prevalent among East Asians (e.g., Japanese) implies control is achieved by adapting oneself to one's situation. These two control motives appear to be consistent with the independent and interdependent sense of self among individualistic and collectivistic societies respectively (Weisz et al., 1984).

Moreover, the characteristics of primary control seem to be consistent with the use of ego-moving metaphor, with the self is perceived to be in active control, attempt to alter or shape environment by exerting influence over it. Concurrently, the use of time-moving metaphor is also consistent with the secondary control, with the self is perceived as

motionless entity dealing with approaching events. It is possible that primary and secondary control might act as pathways through which culture affect judgement or decisions.

This thesis also attempted to bring together two lines of time perception investigations, namely the use of time metaphors and temporal orientation, by examining the relationship between these two-time perceptions. It was predicted that the use of ego-moving metaphor should be related to a reduced in psychological distance to future. This is following the idea (Caruso et al., 2013) that as future approaches, there should be a reduction in temporal distance between the self and the future hence also a reduction in psychological distance. At the same time, as a past recedes from the self, there should be an increase in temporal distance between the self and the past which should result in an increase in psychological distance to the past. However, there was little association between these two-time perceptions as observed in Study 1 and Study 5.

A plausible explanation for this is, the constructs of temporal orientation and time metaphor might simply be independent of each other. It is possible that the use of time metaphor might not be a real psychological construct but instead a conceptual, theoretical, or linguistic mapping that people use to understand and represent time - an abstract concept which cannot be comprehended through concrete dimension. Therefore, the use of time metaphor might only represent people's mental representation of time in-the-moment. On the other hand, temporal orientation represents people's attitude towards a particular event or time period located in a temporal region, which is a largely psychological construct that consists of cognition, affect, and behavioral aspects (Park et al., 2017; Lasane & O'Donnel, 2005). For instance, the measure of temporal orientation (i.e., psychological distance) is based on the assumption of a connection between cognition and affect (i.e.,

how close/distant people feel towards a time point/event). Therefore, it is possible that the two aspects are not directly related to each other.

5.2 Limitations and Methodological Considerations

As the present thesis employed a cross-cultural comparison approach, one of the potential confounding factors is the use of different languages in testing materials for different cultural groups. It is possible that the difference observed between the two cultural groups might be due to different linguistic frameworks in testing materials rather than a difference in actual predisposition itself. It is aware that linguistic interpretation is likely to be a confounding factor in this thesis especially in relation to the use of time metaphors which rely heavily on linguistic interpretation. However, this thesis adopted the back-translation method (Brislin, 1970) to ensure the English and Mandarin versions of testing materials are equivalence. Furthermore, as mentioned previously, previous research (Lai & Boroditsky, 2013) which assessed Mandarin-speakers' use of time metaphors by using English testing materials still showed that they were more likely to adopt time-moving metaphor (vs. English-speakers). Future research may recruit samples that use other languages in order to rule out the effect of language as explanation.

Another important methodological aspect worth noting, not only in this thesis but also in other cross-cultural research, is that individuals from different cultures are likely to have their preferred communication or reporting styles (e.g., in regard to memory reporting) (Masuda & Nisbett, 2001; Wang & Conway, 2004) which might affect the interpretation of a research outcome. For instance, when asked to report what they have been presented with previously, Americans were more likely to start their reporting with the focal object whereas Japanese were more likely to start their reporting with contextual information (Masuda &

Nisbett, 2001). Also relevant is the more specific versus generic memory narrative reporting styles by Western individuals and Chinese individuals respectively (Wang & Conway, 2004). The imagination and memory accounts provided by English and Mandarin-speakers in Study 2 appear to reflect such tendencies. Nevertheless, these observations are consistent with Western individuals' more "focal point" focused tendency and East Asians' more context-bound attentional strategy respectively (Masuda & Nisbett, 2001; Nisbett et al., 1999; Norenzayan et al., 2002).

It should also be noted that this thesis adopted Likert-type format questions which might be liable to extreme responding and acquiescence bias (Van Dijk, Datema, Piggen, Welten, & Van de Vijver, 2009). Although responses which showed characteristics of extreme responding style (i.e., the tendency to select an endpoint of a rating scale) have been excluded during the screening process, this thesis did not, however, account for possible acquiescence bias - people's tendency to agree with questions. Previous related research showed that response styles are related to the characteristics of a participant's culture (e.g., a positive association between acquiescence bias and collectivism – He, Espinosa, Poortinga, & Van de Vijer, 2014). Possible cultural variations in communicating and responding styles should be borne in mind when designing cross-cultural study and interpreting of such findings.

The majority of Mandarin-speaking participants recruited in the present thesis were Chinese university students aged 18 to 25 from mainland China who were born after the introduction of the one-child policy since its inception in 1979. Growing up in an only-child family and also in a social environment with increasing number of single-child families is likely to encourage a relatively more individualistic (or less collectivistic) self-view compared

to their older Chinese peers, who tended to grow up in a multiple-child environment prior this change in social policy. Previous research suggests that individuals who grow up in a single-child family share a more self-oriented self-concept (Cai, Kwan, & Sedikides, 2012; Wang, Leichtman, & White, 1998). For instance, one autobiographical memory study (Wang et al., 1998) has found that they tended to describe themselves using more elaborative private descriptions and fewer collective descriptions, and reported greater self-focused autobiographical memories compared to those who grow up in a multiple-child environment - an indication that a change in social environment is likely to have an impact on basic human dispositions (e.g, self-concept). The studies in the present thesis recruited mainly young adults (aged 18 to 25, university students) and, as such, it remains unknown whether these findings would be generalised to wider range of individuals in the same cultural groups.

In addition, people from different parts of the world are integrating at an ever-increasing pace in various aspects including trading, education, social, political, among others. These rapid changes or advancement in socioeconomic aspects in East Asian countries are likely to impact the priorities individuals place as greater socioeconomic advancement promotes individualist aspects (e.g., income, health, employment status). A more modernised society tends to be associated with characteristics that are more individualistic in nature (e.g., self-independence, personal efficacy, personal autonomy, gender equality, freedom of choice) (Steele & Lynch, 2013). There is also supportive evidence that some Eastern cultures are becoming more individualistic (Cai et al., 2012; Steele & Lynch, 2013). For instance, by using the World Values Survey data collected in

China in 1995, 2001, and 2007, Steele and Lynch (2013) found that Chinese individuals²⁴ showed increasing tendency of emphasizing individualist factors (e.g., income, health, employment status) in their assessment of life satisfaction and happiness.

Lastly, it is important to note that there are variations in many aspects including history, culture, political and economic factors, and language, to name a few, both within and between countries from the same continent. I would like to acknowledge that there is within-group diversity in both English and Mandarin-speakers groups recruited in this thesis. For example, Mandarin-speakers from China reported themselves as less likely to adopt ego-moving metaphors compared to those from Malaysia²⁵. However, separate analysis conducted with each of the participant group revealed similar results and did not change this thesis conclusion.

5.3 Open Questions for Future Research

Although this thesis observed a robust cultural variation in the use of time metaphors, there was little evidence of a relationship between the use of time metaphor and perceived personal control. Therefore, a question for future research is whether a temporary change in one's use of a particular time metaphor will affect sense of personal control. As discussed in Chapter 1, the concept of time metaphors is very much related to embodied cognition - the idea that our understanding of abstract and complex concepts which cannot be comprehended directly can be experienced in the bodily dimension (Lakoff & Johnson, 1999). If time metaphors are experienced by the physical bodily self (e.g.,

²⁴ Individuals age 18 to 65 living in urban China.

²⁵ Mandarin-speakers from China ($M = 0.004$, $SD = 0.03$) were less likely to take ego-moving metaphors compared to those from Malaysia ($M = 0.15$, $SD = 0.24$), $F(1, 369) = 74.64$, $p < .001$, $\eta_p^2 = .17$.

traveling on train/plane), the question is raised of whether such embodiment in the physical dimension would affect one's perception of control in-the-moment. Therefore, an alternative means of investigating this relationship is by manipulating participants' physical movement (i.e., move forward in space) or with the help of virtual reality technology to create an illusory sense of movement that is compatible with their use of time metaphor. This can provide more insights on how bodily experience shape people's metaphorical representation of time and also reduce the involvement of language which is a potential confounding factor.

The existing literature (e.g., Ji et al., 2009) and the present research tested hypotheses using the conception of temporal orientation, with the assumptions that a future (or past) oriented frame of mind would be related to closer psychological distance to a timepoint (Study 1 & 5) or event (Study 2) in the future (or the past). However, it is possible that the use of a timepoint or an event is likely to direct people's minds to different aspects. For instance, an event is a more concrete target compared to a timepoint which is relatively more abstract in nature. This is because generally a more concrete target (e.g., cat, apple, tree) is likely to lead to more mental images being generated compared to an abstract target (e.g., intelligent, honesty, active; Paivo, 1965). Presumably this is because people have more knowledge or information in relation to concrete concepts which can be retrieved from memory. Thus, a target such as a designated event should promote a more imagery mental representation compared to a target of time point which possibly invite a relatively wider interpretation. Future studies should clarify the use of more abstract vs. concrete measures as an indication of temporal orientation. By doing so, it will provide a better understanding on how culture, temporal orientation, and target are related.

Lastly, Gao (2016) suggested that East Asians might have a longer temporal focus compared to Western individuals. This is possibly due to their cyclical view of time, as they perceive events to be more likely to repeat or transform themselves within a cycle. This perception of event unfold within a cycle is a more 'big picture' view in nature, which appears to be in line with their dominant use of holistic thinking style (i.e., a predisposition to view elements as interconnected). In contrast, Western individuals' linear view of time is comparatively more short-term focused. This might be related to their more analytical thinking style (i.e., a predisposition to focus on focus point) in general which enables them to focus on a shorter time span, hence encouraging a relatively more stable world view (e.g., less anticipation of a change, Ji, Zhang, Guo, 2008; Ji et al., 2009). Although this thesis has sampled multiple time points and found similar results for both time points (a month and a year), future studies may incorporate wider variations of temporal depth in their studies on temporal orientation, in order to better understand how a short vs. long-term focus of temporal orientation of individuals from different cultures affects the priorities they place.

5.4 Concluding Remarks

As the world is now changing with an ever-increasingly fast pace, people from different cultures are also interacting at a higher frequency than before. A key way to reduce the intercultural gap is through better understanding. This thesis set out to bring together culture and time perception by investigating whether and how culture and time perception are related, and how they relate to a range of other cognitive processes including mental representation and decisions.

At a broad level, the findings across the seven studies reported in this thesis suggest that cultural effects can be observed in time perceptions and mental representations.

However, there was limited supportive evidence of such tendencies to influence further downstream judgment and decisions, which have led to the discussion of a range of methodological considerations and further research suggestions.

Overall, it would seem that cultural effects are observable in many fundamental human cognitions including the use of visual perspective, perceived personal control, and the content of mental representation. The relationship between culture, cognition, and judgment or decisions appears to be inseparable and deeply entwined with each other. It is hoped the present thesis can provide useful information and potential directions for future research to build on and refine in the search for a more thorough understanding of how culture and time are related.

Appendix A – Part I

Online Recruitment Sources

<http://psych.hanover.edu/research/exponnet.html>: A website listing online psychological related research studies. This website is maintained by John H. Krantz, PhD. and sponsored by the Hanover College Psychology Department

<http://www.in-mind.org/content/online-research>: This is a website of the magazine, Inquisitive Mind which maintains a directory of online psychological research studies.

<http://www.legacy.socialpsychology.org//expts.htm>: This is a website of Social Psychology Network, a website devoted to psychological research and teaching which contains links to online psychological related experiments, surveys and other social psychology studies.

<https://www.douban.com/>: This is a Chinese social networking website allowing posting study to recruit participants from all social and educational backgrounds.

www.facebook.com: A social media and social networking website allowing posting study to recruit participants from all social and educational backgrounds.

Appendix A - Part II

Time Metaphor Questions for Study 1

(Adapted from Lai & Boroditsky, 2013 and Richmond, et al., 2012)

The meeting question

'Next Wednesday's meeting has been moved forward two days. What day is the meeting now that it has been rescheduled?'

A response of 'Friday' will be categorized as an ego-moving response whereas a response of 'Monday' will be categorized as a time-moving response.

The clock question

'Suppose the clock says it is 1pm now. You need to move it one hour forward. What time will it be adjusted to?'

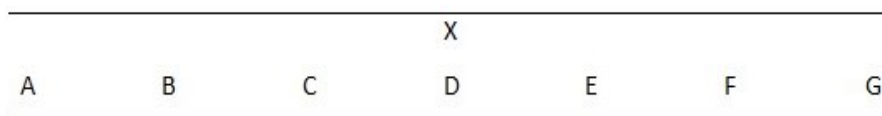
A response of '2pm' will be categorized as an ego-moving response whereas a response of '12pm' will be categorized as a time-moving response.

The book question

'A book will be re-edited so that 'page 10' will move forward 5 pages. What page will 'page 10' now appear on?'

A response of 'page 15' will be categorized as an ego-moving response whereas a response of 'page 5' will be categorized as a time-moving response.

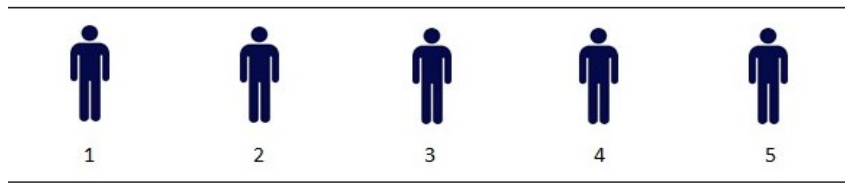
The block marked 'X' question



The Block marked 'X' in block D in the diagram has been moved forward three places. Which column is the block in now that it has been moved?

A response of 'G', 'number 5' will be categorized as an ego-moving response whereas a response of 'A' will be categorized as a time-moving response.

The 5 people question



There are 5 people standing in the above diagram. Person number 3 moves forward two places. Is person number 3 now standing in box number 1 or box number 5?

A response of 'number 5' will be categorized as an ego-moving response whereas a response of 'number 1' will be categorized as a time-moving response.

The alphabet question

H I J K L M N O P Q R S

The letter 'M' in the alphabet has been moved forward four places. What letter will the letter 'M' now follow in its new position?

A response of 'P', 'Q', or 'R' will be categorized as an ego-moving response whereas a response of 'H', 'I', or 'J' will be categorized as a time-moving response.

Appendix A - Part III

Construal Questions for Study 1

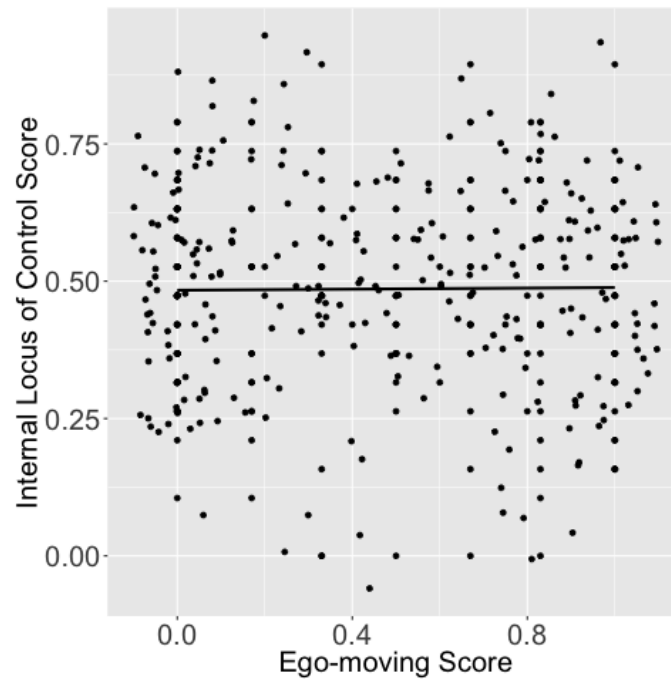
(Adapted from Fujita, et al., 2006 and Vallacher & Wegner, 1989)

Actions	Low-Level Construal Response	High-Level Construal Response
<i>Toobrushing</i>	Moving a brush around in one's mouth	Preventing tooth decay
<i>Taking a test</i>	Answering questions	Showing one's knowledge
<i>Greeting someone</i>	Saying hello	Showing friendliness
<i>Resisting temptation</i>	Saying "no"	Showing moral courage
<i>Eating</i>	Chewing and swallowing	Getting nutrition
<i>Growing a garden</i>	Planting seeds	Getting fresh vegetables
<i>Traveling by car</i>	Following a map	Seeing countryside
<i>Talking to a child</i>	Using simple words	Teaching a child something
<i>Pushing a doorbell</i>	Moving a finger	Seeing if someone's home
<i>Staying home to study</i>	Reviewing one's notes	Exerting self-discipline
<i>Recycling</i>	Bagging paper, glass, & cans	Caring for the environment
<i>Teaching</i>	Talking to students	Having authority
<i>Meeting new people</i>	Small talk and shaking hands	Enhancing one's social network
<i>Filling out a personality test</i>	Answering questions	Revealing what you're like
<i>Picking an apple</i>	Pulling an apple off a branch	Getting something to eat
<i>Sweeping the floor</i>	Moving a broom	Being clean
<i>Skydiving</i>	Jumping out of an aeroplane	Demonstrating one's daringness
<i>Making an expensive purchase</i>	Swiping a credit card	Doing something for one's pleasure
<i>Attending a class</i>	Sitting in a chair	Looking at a teacher
<i>Making a list</i>	Writing things down	Getting organized
<i>Reading</i>	Following lines of print	Gaining knowledge
<i>Joining the Army</i>	Signing up	Helping the Nation's defence
<i>Chopping down a tree</i>	Wielding an axe	Getting firewood
<i>Measuring a room for carpeting</i>	Using a yard stick	Getting ready to remodel
<i>Cleaning the house</i>	Vacuuming the floor	Showing one's cleanliness
<i>Painting a room</i>	Applying brush strokes	Making the room look fresh
<i>Paying the rent</i>	Writing a check	Maintaining a place to live
<i>Caring for houseplants</i>	Watering plants	Making the room look nice
<i>Locking a door</i>	Putting a key in the lock	Securing the house
<i>Voting</i>	Marking a ballot	Influencing the election
<i>Climbing a tree</i>	Holding on to branches	Getting a good view

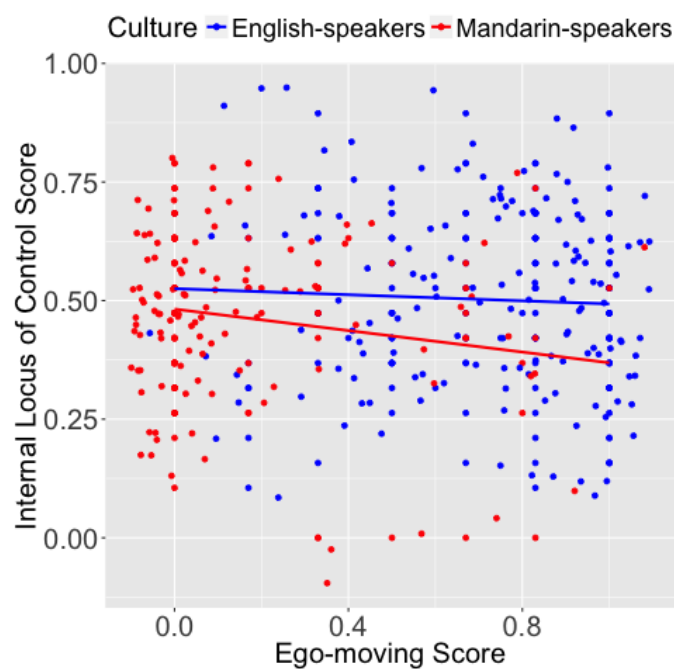
Appendix A – Part IV

Scatter Plots for Study 1

The scatter plot of the ego-moving response and internal locus of control (overall sample)



The scatter plot of the ego-moving response and internal locus of control by culture



Appendix B

Imagination and Memory Account Examples for Study 2

Imagination Account Examples by English-speakers.

Subject # 8 Female

I am sat in my kitchen in my new house with my mum, dad and great uncle. My sister isn't here for the first time because she is working. Dinner is smaller than usual because the ovens tiny, but it's alright. Dinner is smaller than usual because the ovens tiny, but it's alright. There are Christmas crackers and festive stuff everywhere. My dogs are sat under the table and the cats in the living room. Everyone is drinking and talking about different things. My plate is covered with a bit of everything and swamped in gravy. We're discussing which game to play first, articulate or cluedo. It's very cold so we bring a heater and blankets into the kitchen. It's probably dark outside but can hear the ocean still. Our presents from earlier are just around the house. Everybody's wearing nice clothes, probably a new piece of clothing which was given as a present.

Subject #25 Female

There would be lots of delicious food: roast turkey, vegetables, yorkshires, etc. My family would all be chatting and laughing around the table (mum, dad, sister and relatives). There would probably be a bit of harmless bickering as mum gets stressed but overall happy event. We would all be drinking wine and pulling crackers and party poppers. We would all be catching up on everything in the past year. All excited to open presents and celebrate together.

Subject #49 Female

I am sat around the table with my mum's family. We do alternate years, one year mum, one year dad. My grandad is drunk making jokes in a Scottish accent, whilst the rest of us cringe! Sam my step grandma is sat petting the dogs, not speaking to anyone else and my brother is being the Christmas Grinch! My mum is in the kitchen cooking away at the food, stressing that no one will like it and my step father and I sit back and watch it all take place! My grandma arrives, with her dog which makes our dogs go mad! she fusses over everyone, and my mum stresses even more now. Finally, we sit down, the food smells amazing, as always! The tree is flashing so brightly we almost get an epileptic fit from it, but that's the way mum likes it! sitting down we all compliment the food to which mum always responds, I hope you all like it, it wasn't much! after dinner is done and we all feel stuffed.

Subject #65 Male

We would have travelled up to visit nans house with my parents and sister, as well as my two uncles and we would be around the big table after setting it all up in the main living room, the TV would probably have some christmas special show on but turned down while were at the table, nan would come out with dishes full of food for us to help ourselves, though the food and the plates would be too hot to start with. There might be snow outside which I could almost see through the patterned net curtains, and the heating would be on

and coming through the floor vent just beside the table. There would be potatoes in one bowl, with all the other vegetables in another massive dish, stuffing in one tray and all the different meats in another big ceramic tray. There would also be christmas crackers on the table for us all an

Subject #75 Male

Christmas tree and lights are on. On the television is the movie Home Alone. Fire is crackling in the fireplace. The dog is lying down chewing on a bone after Christmas dinner. The younger kids are playing with their brand new toys. Snow is falling outside. The family is all wearing Christmas jumpers. Were in Switzerland for snowboarding and skiing. But now its dark and were inside drinking hot chocolate for the kids and wine for the adults. Everyone is full from the roast turkey and vegetables. Mum is in the kitchen dealing with leftover food, putting it in the fridge for boxing day. Another log goes on the fire. The Anatolian Mastiff has finished his bone and is lying on its back next to the fire, allowing his belly to be warmed up. A funny scene in the film comes up and the family laugh.

Memory Account Examples by English-speakers.

Subject # 8 Female

We ate at my great uncle's house, which is just next door to us. Everything was cooked at his because our oven is too small at our house. It was a weird Christmas because my sister wasn't there and it was our first time in our new house. This year the bread sauce and red cabbage was from a packet (and not as good as mum's usual). The starter was melon and ham and it was very nice. Main was turkey with all the trimmings and then dessert was cheesecake and a cheese board. It was all very lovely. I felt very ill because that's the day my cold started so half way through I had to leave and take some tablets. I didn't drink any alcohol for the entire day, only water. The TV was on in the background, first was Frozen, then it went onto Only Fools, which was hilarious. Mum sat next to me, Geoff sat to my left and dad was at the head of the table. It was a very weird and very nice day. The crackers were very bad.

Subject #25 Female

There was lots of delicious food - turkey, vegetables, yorkshires etc. For dessert we had fruit salad. My family (mum, dad and sister) are all sat round the table chatting and laughing. First we pull crackers and put the hats on our heads. Then we open a bottle of wine to share before we begin eating and chat about the rest of the day, our presents, etc.

Subject #49 Female

I am sat around at the dinner table with all of my family. Grandad is asleep in the armchair and my grandma is in the kitchen telling my mum how to cook the roast potatoes correctly like she does every year! I can smell the food and it lingers in from the kitchen. Christmas is never a great time with divorced parents but the food and the presents seem to soften the blow a little each year! I've already had my Norwegian Christmas with my dad the day before so I'm not as hungry as everyone else but the pudding will be the best bit!

Subject #65 Male

There was 9 of us sat around the slightly rounded table with a floral patterned tablecloth over it, with different plates and ceramic bowls full of food in the centre and large metal spoons for handing out the food. There was a bottle of regular champagne half finished on the table after it had been poured out beforehand, and there was also a large bottle of coke for those who weren't drinking. In front of each person was a hot ceramic plate with different types of flowers on them.

Subject #75 Male

Thailand. A jungle valley with the sea a few hundred metres away. Looking down upon it from the Thai mountain house that my parents built and lived in. Classic music played from the lounge, overlooking the swimming pool. The turkey was put onto the table. My Mum, Dad, twin sister and older brother as well as my cousin and her daughter, all started to sit round the dinner table. We had just skyped family in Australia and the UK. I was asked to carve the turkey. The white meat was easy. But I struggled with the wings and the legs. So I just yanked them off in the end. I passed the meat around and it was placed on various plates. Metal spoons scraped the bottom of the serving dishes as people collected roast potatoes and carrots. The click and clank of tongs to grab broccoli and cauliflower. The smell of jasmine in the air from the bushes outside. 4 of our 15 dogs were sitting around the table in anticipation for a stray piece of turkey to fall off the table and onto the floor. Wind chimes sounded in the distant from the little hut next to the swimming pool. A light breeze swept across us.

Imagination Account Examples by Mandarin-speakers.

Subject # 6 Female

There are steaming dishes on the table. Together with grandad and grandma, there are 15 of us sat on the table talking and laughing. We are talking about things that we look forward to in 2018. There are our favourites home-cooked dishes on the table, we are savouring them.

Subject #13 Female

My family all gathered at grandad's house. My cousin and her husband who came back from abroad are here too. Everyone is very happy, discussing where to go in the new year to have fun. My cousin talks about things that happened abroad, we are eating delicious dishes, having a happy New Year's Eve!

Subject #39 Male

Our family is watching Spring Festival Gala, sitting around eating the reunion dinner happily. We are talking about things that happened in the last year, and discussing what we need to do in the coming year. It is full of festive atmosphere and the reunion feeling, the dishes that we eat are not important, what matters is us. After dinner, we talk about domestic matters, visit our friends.

Subject #47 Female

Around 2 o'clock in the afternoon, the whole family gathered at the grandma's house. Dad or uncle prepared braise chicken and fried fish. My aunties made dumplings, most of which were mutton and carrot stuffing, only around twenty of the dumplings were vegetarians which were especially made for grandma, because she is getting older, cannot eat meat, usually bean curd and egg stuffing. It is four in the afternoon after getting ready, our reunion dinner usually starts at 4 o'clock. We placed two tables in the living room, uncles sat at the table which served alcohol drinks. We women who don't drink alcohol and children occupied another table.

Subject #83 Male

The family sat around the table, eating a steaming and delicious New Year's Eve dinner, chattering about domestic trivia, discussing interesting things that happened this year, enjoyable.

Memory Account Examples by Mandarin-speakers.

Subject #6 Female

This is a simple New Year's Eve dinner. There were three of us who came back to the parents' home for the new year. Although there were not many dishes, but they were all what we like to eat. Children greet the elderly politely, wish them a healthy and long life.

Subject #13 Female

Our family sat around the table. There were many relative and friends, many of whom I did not know. Everyone was talking and laughing, very happy! There were many kids, the delicious food was given to them by the adults!

Subject #39 Male

During the reunion dinner that took place fourteen days ago, our family gathered around for our New Year's Eve dinner. Everyone talked and laughed, we then watched the Spring Festival Gala.

Subject #47 Female

It was as usual at the beginning. Everyone gathered at grandma's house after two o'clock in the afternoon, to make dumplings, preparing cold dishes. It's ready around three o'clock. Everyone takes a rest, and has a chat, dinner officially started at four. This year's chicken legs were delicious, and they were quickly eaten up. The cold dishes, which have always been popular, nobody eats because of the cold weather, and the heating in the house is not functioning well. After dinner, the children are responsible for washing dishes and preparing for new year greetings. This year, there were some accidents that made everyone feel bad, it was considered a rather bad thing. I am still unhappy when I think of it, not sure what will happen next year.

Subject #83 Male

Mom has prepared a table full of tasty dishes, the family sat around together, the steaming dishes drove away the cold of the winter. We were talking and laughing, eating the dishes

that we missed for a long time, savouring them slowly, I really wish that time would stop at this moment.

Appendix C

Hypothetical Nostalgic Item Scenarios (Study 4)

Role: Seller

Scenario 1

Imagine you are selling a t-shirt you got when you saw your favourite band in concert. The t-shirt brings back good memories however, it no longer fits you and you wish to sell it so someone else may enjoy it.

Scenario 2

Imagine you are selling a sports shirt, the shirt represents your favourite team and you have some good memories of times that you wore this shirt and your team won. There is now a new team shirt that you wish to buy and you are hoping to get some money to pay for the new shirt by selling your old one.

Scenario 3

Imagine you are selling your childhood teddy bear that was given to you by a family member. You used to take this teddy bear with you everywhere and it was your favourite as a child. You no longer need a teddy bear and have decided to sell it so that someone else may get pleasure from it as you did.

Scenario 4

Imagine you are selling your favourite book from your childhood. You have read it you and have read it yourself multiple times. You know the story very well. You are selling the book for some extra money as you no longer read it, and you hope that it may become someone else's favourite as well.

Scenario 5

Imagine you are selling a pair of shoes. These shoes are in very good condition and may have only been worn once or twice. These shoes remind you of a special occasion, such as, a wedding or graduation, however you know it is unlikely you will ever wear them again. You have decided to sell them to get some extra money and so that they will be worn and not locked away in a cupboard any more.

Scenario 6

Imagine you are selling your old university jumper. You no longer wear the jumper but it reminds you of the time you spent at university. You have decided to sell it after sorting out your wardrobe.

Scenario 7

Imagine you are selling a CD, it is the first CD you ever bought. You no longer play CDs as you have all your music on your computer and no longer have a device to play them on, so you decided to sell all of your old CDs.

Role: Buyer

Scenario 1

Imagine you are buying a t-shirt. You see a t-shirt for sale that is from a concert of your favourite band that you went to years ago. You have good memories from that night and wished you had bought a t-shirt at the time.

Scenario 2

Imagine you are buying a sports shirt. It represents your favourite team and is the version that was worn during one of the best matches you ever saw. You want to buy the shirt to remind you of that day.

Scenario 3

Imagine you are buying a teddy bear for your child. You come across one that reminds you of the toy you had as a child, you want to buy this toy for your own child as you remember your own teddy bear fondly.

Scenario 4

Imagine you are buying a book, you see an old book that you loved in your childhood but have not seen for a long time. You remember enjoying the book as a child and wish to read it again, and share it with your own child.

Scenario 5

Imagine you are buying shoes for an upcoming event, for example a wedding or graduation. You find a pair of shoes that would be perfect for the event. Finding these shoes make you all the more excited for the upcoming event.

Scenario 6

Imagine you shopping online and come across a jumper from your old university. Seeing the jumper makes you smile and remember the good times you had at university.

Scenario 7

Imagine you are shopping online and you come across the first CD you ever bought. You may not even like the song anymore but you remember playing that CD repeatedly as soon as you had bought it, this brings back good memories and you wish to own the CD again.

Appendix D – Part I

Positive and Negative Life Events for Study 5

(Adapted from Joshi & Carter, 2013)

Positive life Events:

Owning your own home
Winning the lottery
Good health in old age
Son/daughter getting a very good job
Success for self and spouse at work
Living a long life
Having exotic holiday
Moving to a better home
Getting a better job offer
Unexpectedly inheriting some money

Negative life events:

Attempt suicide
Getting cancer
Hate your chosen career
After growing old you will find out that you never realised your most important dreams
Unable to own your own home
Having a heart attack before the age of 60
Being burgled
Having very serious financial problems
Son/daughter having a serious illness
Divorce

Appendix D – Part II

Questionnaire Instructions in Study 5

(Adapted from Joshi & Carter, 2013)

Optimistic example:

“The chances of an event occurring in your life may be the same or different from the chances of event occurring in the lives of people like you. For example, you might think that the chance of you having heart attack is 30% and the chance of people like you is also 30%; or you may think that because your health is very good the chance of you having a heart attack is only 10% and the chance of people like you having a heart attack is 30%”

Pessimistic example:

“The chances of an event occurring in your life may be the same or different from the chances of event occurring in the lives of people like you. For example, you might think that the chance of you having heart attack is 30% and the chance of people like you is also 30%; or you may think that because your health is not good the chance of you having a heart attack is 70% and the chance of people like you having a heart attack is 30%”.

Appendix E

Correlations of Measures in Study 5

Table E1. Bivariate correlations among all measures in Study 5 (+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$) for (a) overall sample, (b) English-speakers only, and (c) Mandarin-speakers only.

(a) Overall sample ($N = 183$)

	Ego-Moving	Distance 1 month future	Distance 1 month past	IPC-Internal	IPC-Powerful others	IPC-Chance	Control (Positive)	Control (Negative)	Optimism (Positive)	Optimism (Negative)
Ego-Moving	1	-.127+	.021	-.045	-.080	-.042	-.286***	.045	.026	-.107
Distance 1 month future		1	.571***	.083	.056	.024	.019	-.054	.014	.007
Distance 1 month past			1	.091	.155*	.009	.086	.005	-.036	-.076
IPC-Internality				1	-.236**	-.306***	.343***	.081	.111	-.020
IPC-Powerful Others					1	.637***	-.089	.160*	-.063	-.008
IPC-Chance						1	-.131+	.082	-.084	-.126+
Control-Positive							1	.178*	.142+	.102
Control-Negative								1	-.052	.215**
Optimism-Positive									1	.277***
Optimism-Negative										1

b) English-speakers (*N* = 91)

	Ego- Moving	Distance 1 month future	Distance 1 month past	IPC- Internal	IPC- Powerful others	IPC- Chance	Control (Positive)	Control (Negative)	Optimism (Positive)	Optimism (Negative)
Ego-Moving	1	.182+	.109	-.048	.017	.049	-.096	-.083	-.038	-.106
Distance 1 month future		1	.727***	.130	.050	-.071	-.075	-.028	-.021	-.144
Distance 1 month past			1	.126	.149	-.029	-.019	-.059	-.117	-.224*
IPC-Internality				1	-.076	-.220*	.246*	.311**	.109	-.046
IPC-Powerful Others					1	.599***	-.129	-.207*	-.108	-.152
IPC-Chance						1	-.061	-.128	-.045	-.213*
Control-Positive							1	.666***	.218*	.142
Control-Negative								1	.133	.228*
Optimism-Positive									1	.372***
Optimism-Negative										1

c) Mandarin-speakers (*N* = 90)

	Ego- Moving	Distance 1 month future	Distance 1 month past	IPC- Internal	IPC- Powerful others	IPC- Chance	Control (Positive)	Control (Negative)	Optimism (Positive)	Optimism (Negative)
Ego-Moving	1	.008	-.031	-.189	.090	.199	-.129	-.046	-.108	-.055
Distance 1 month future		1	.375***	.027	.020	.095	-.034	-.049	.065	.112
Distance 1 month past			1	.047	.168	.054	.183+	.064	.047	.077
IPC-Internality				1	-.361***	-.396***	.428***	-.053	.115	-.003
IPC-Powerful Others					1	.673***	-.125	.354**	-.030	.070
IPC-Chance						1	-.237*	.233*	-.111	-.066
Control-Positive							1	.012	.135	.048
Control-Negative								1	-.149	.224*
Optimism-Positive									1	.225*
Optimism-Negative										1

Appendix F

Risk-preferences Questionnaire in Study 5

(Adapted and modified from Hsee & Weber, 1999)

Investment

Imagine you have some savings. Suppose that there are only two investment options:

A: Buy a particular stock: Its return rate will vary

B: Put the money in a savings account: Its return rate is fixed.

(Return rate refers to annual return rate here. For example, a return rate of 4% means that for every \$100 you invest, you will get \$4 extra after a year.)

From either option, you can withdraw your money at any time without penalties. Suppose that these are the only investment options available, and that you can choose only one of the two, not both. Assume also that if you want to buy the stock, you must buy it now. If you miss this chance, you can't buy it later.

Each scenario below describes the return rates of the two options. Read each scenario carefully and select the option you would choose in that scenario.

*

- ☐ Stock: either 0% or 8% with equal probabilities
- ☐ Savings: exactly 2%

*

- ☐ Stock: either 0% or 8% with equal probabilities
- ☐ Savings: exactly 4%

*

- ☐ Stock: either 0% or 8% with equal probabilities
- ☐ Savings: exactly 6%

Monetary Gambles (Gain Frame – Large Magnitude)

Suppose that you bought a lottery ticket a week ago. You are now informed that you have won and have been given two options of how to receive the money.

Select the option that you would choose in each of the following decisions.

*

- ☐ Receive \$400 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$600 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$800 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$1000 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$1200 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$1400 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$1600 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

Monetary Gambles (Gain Frame - Small magnitude)

Suppose that you bought a lottery ticket a week ago. You are now informed that you have won and have been given two options of how to receive the money.

Select the option that you would choose in each of the following decisions.

*

- ☐ Receive \$20 for sure
- ☐ Flip a coin; receive \$100 if H or \$0 if T

*

- ☐ Receive \$30 for sure
- ☐ Flip a coin; receive \$100 if H or \$0 if T

*

- ☐ Receive \$40 for sure
- ☐ Flip a coin; receive \$100 if H or \$0 if T

*

- ☐ Receive \$50 for sure
- ☐ Flip a coin; receive \$100 if H or \$0 if T

*

- ☐ Receive \$60 for sure
- ☐ Flip a coin; receive \$100 if H or \$0 if T

*

- ☐ Receive \$70 for sure
- ☐ Flip a coin; receive \$100 if H or \$0 if T

*

- ☐ Receive \$80 for sure
- ☐ Flip a coin; receive \$100 if H or \$0 if T

Monetary Gambles (Loss Frame - Large magnitude)

Suppose that you violated a traffic rule and hurt somebody a week ago. You are now informed that you will be fined and have been given two options of how to pay the fine.

Select the option that you would choose in each of the following decisions.

*

- ☐ Receive \$400 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$600 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$800 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$1000 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$1200 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$1400 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

*

- ☐ Receive \$1600 for sure
- ☐ Flip a coin; receive \$2000 if H or \$0 if T

Monetary Gambles (Loss Frame – Small Magnitude)

Suppose that you violated a traffic rule and hurt somebody a week ago. You are now informed that you will be fined and have been given two options of how to pay the fine.

Select the option that you would choose in each of the following decisions.

*

- ☐ Pay \$20 for sure
- ☐ Flip a coin; pay \$100 if H or \$0 if T

*

- ☐ Pay \$30 for sure
- ☐ Flip a coin; pay \$100 if H or \$0 if T

*

- ☐ Pay \$40 for sure
- ☐ Flip a coin; pay \$100 if H or \$0 if T

*

- ☐ Pay \$50 for sure
- ☐ Flip a coin; pay \$100 if H or \$0 if T

*

- ☐ Pay \$60 for sure
- ☐ Flip a coin; pay \$100 if H or \$0 if T

*

- ☐ Pay \$70 for sure
- ☐ Flip a coin; pay \$100 if H or \$0 if T

*

- ☐ Pay \$80 for sure
- ☐ Flip a coin; pay \$100 if H or \$0 if T

Academic

Imagine you are taking an important business course now. Your final grade for this course will depend heavily on an essay (paper) that will be due next week. Scores on the paper can range anywhere from 0 to 100.

You are debating whether to write on a conservative (traditional) topic or on a provocative (tending to provoke or irritate) topic. If you choose the conservative topic, you know how much your professor will like it and what score you will receive. If you choose the provocative topic, you don't know how much your professor will like it and don't know what score you will get.

Each scenario below describes your estimates of what score you will get on the paper if you write on the conservative topic or the provocative topic. Read each scenario carefully and select the topic you would choose in that scenario.

*

- Provocative topic: either 60 or 100 with equal probabilities
- Conservative topic: exactly 70

*

- Provocative topic: either 60 or 100 with equal probabilities
- Conservative topic: exactly 80

*

- Provocative topic: either 60 or 100 with equal probabilities
- Conservative topic: exactly 90

Medical

Imagine you are experiencing a severe headache. After a thorough examination, your doctor told you that it is not serious, will automatically go away and will not cause any permanent damages. However, it will take 10 days before it goes away if you don't take any medicine.

There are two imported drugs on the market that can help reduce the duration of your headache: Drug A and Drug B. Both drugs are free with your doctor's prescription.

Each scenario below describes the number of days by which each drug will reduce the duration of your headache.

Read each scenario carefully and select the drug you would take in that scenario.

*

- Drug A: reduce headache by either 0 or 8 days with equal probabilities
- Drug B: reduce headache by exactly 2 days

*

- Drug A: reduce headache by either 0 or 8 days with equal probabilities
- Drug B: reduce headache by exactly 4 days

*

- Drug A: reduce headache by either 0 or 8 days with equal probabilities
- Drug B: reduce headache by exactly 6 days

Asian Disease Problem (Gain Frame)

(Adapted and modified from Tversky & Kahneman, 1981)

Imagine that the U.K. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

If Program A is adopted, 200 people will be saved.

If Program B is adopted, there is $\frac{1}{3}$ probability that 600 people will be saved, and $\frac{2}{3}$ probability that no people will be saved.

Which of the two programs would you favour?

- ☐ Program A
- ☐ Program B

Asian Disease Problem (Loss Frame)

(Adapted and modified from Tversky & Kahneman, 1981)

Imagine that the U.K. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

If Program A is adopted, 400 people will die.

If Program B is adopted, there is $\frac{1}{3}$ probability that nobody will die, and $\frac{2}{3}$ probability that 600 people will die.

Which of the two programs would you favour?

- ☐ Program A
- ☐ Program

Appendix G

Correlations of Measures in Study 6A

Table G1. Bivariate correlations among all measures in Study 6A (+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$) for (a) overall sample, (b) English-speakers only, and (c) Mandarin-speakers only

(a) Overall sample ($N = 205$)

	Ego-Moving	IPC-Internal	IPC-Powerful Others	IPC-Chance	RPI Large Gain	RPI Small Gain	RPI Large Loss	RPI Small Loss	RPI Invest	RPI Medical	RPI Essay
Ego-Moving	1	.181**	-.269***	-.196**	.023	.026	-.126	-.085	.079	-.133	-.068
IPC-Internality		1	.017	.053	.055	.018	-.134	-.128	-.024	-.108	-.109
IPC-Powerful Others			1	.580***	.073	-.019	-.020	-.073	-.073	.092	-.070
IPC-Chance				1	-.077	.009	.086	-.030	-.005	-.015	.062
RP Index – Large Gain					1	.648***	-	-	.341***	.128	.329**
RP Index – Small Gain						1	-	-	.519***	.345**	.402***
RP Index – Large Loss							1	.719***	.122	.127	.138
RP Index – Small Loss								1	.288**	.006	.155
RP Index – Investment									1	.376***	.332***
RP Index – Medicine										1	.226*
RP Index – Essay											1

(b) English-speakers (*N* = 100)

	Ego-Moving	IPC-Internal	IPC-Powerful Others	IPC-Chance	RPI Large Gain	RPI Small Gain	RPI Large Loss	RPI Small Loss	RPI Invest	RPI Medical	RPI Essay
Ego-Moving	1	.027	-.097	-.026	.019	-.078	-.151	-.035	.025	-.014	.059
IPC-Internality		1	.055	.069	-.124	-.180	-.296*	-.222	-.054	.015	-.141
IPC-Powerful Others			1	.492***	.239	.036	.046	-.124	-.035	.348*	-.193
IPC-Chance				1	.023	.113	.095	-.044	.035	.149	-.070
RP Index – Large Gain					1	.649***	-	-	.263+	.142	.433**
RP Index – Small Gain						1	-	-	.441**	.295	.329*
RP Index – Large Loss							1	.717***	.039	.148	.210
RP Index – Small Loss								1	.317*	.061	.437**
RP Index – Investment									1	.302*	.220*
RP Index – Medicine										1	-.080
RP Index – Essay											1

(c) Mandarin-speakers (*N* = 105)

	Ego-Moving	IPC-Internal	IPC-Powerful Others	IPC-Chance	RPI Large Gain	RPI Small Gain	RPI Large Loss	RPI Small Loss	RPI Invest	RPI Medical	RPI Essay
Ego-Moving	1	.069	.042	.044	-	-	.019	.059	-.003	-.041	-.054
IPC-Internality		1	.100	.136	.207	.131	.066	-.023	-.031	-.118	-.051
IPC-Powerful Others			1	.645***	-.073	-.044	-.179	-.063	-.074	-.077	-.005
IPC-Chance				1	-.198	-.084	.029	-.056	-.005	-.139	.147
RP Index – Large Gain					1	.648***	-	-	.387**	.119	.271+
RP Index – Small Gain						1	-	-	.557***	.372**	.456***
RP Index – Large Loss							1	.727***	.209	.112	.028
RP Index – Small Loss								1	.263+	-.010	-.224
RP Index – Investment									1	.426***	.420***
RP Index – Medicine										1	.356***
RP Index – Essay											1

Appendix H

Correlations of Measures in Study 6B

Table H1. Bivariate correlations among all measures in Study 6B (+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$) for (a) overall sample, (b) English-speakers only, and (c) Mandarin-speakers only.

(a) Overall sample ($N = 162$)

	Ego-Moving	IPC-Internality	IPC-Powerful Others	IPC-Chance	Social Risk Taking	Ethical Risk Taking	Financial Risk Taking	Health Risk Taking	Recreation Risk Taking
Ego-moving	1	.022	.024	.145+	.082	-.016	-.210**	.118	-.077
IPC-Internality		1	-.203**	-.256**	.073	-.159*	-.095	-.038	.006
IPC-Powerful others			1	.643***	-.313***	.280***	-.006	-.062	-.161*
IPC-Chance				1	-.169**	.312***	.028	.075	-.053
Social Risk Taking					1	.057	.101	.216**	.331***
Ethical Risk Taking						1	.236**	.399***	.162*
Financial Risk Taking							1	.176*	.289***
Health Risk Taking								1	.340***
Recreational Risk Taking									1

(b) English-speakers (*N* = 88)

	Ego- Moving	IPC- Internality	IPC- Powerful Others	IPC- Chance	Social Risk Taking	Ethical Risk Taking	Financial Risk Taking	Health Risk Taking	Recreation Risk Taking
Ego-moving	1	-.251*	.103	.318**	-.012	.059	.115	.012	-.026
IPC-Internality		1	-.191+	-.312**	.075	-.223*	-.004	-.015	.062
IPC-Powerful others			1	.580***	-.250**	.220*	.040	-.054	-.121
IPC-Chance				1	-.084	.310**	.046	.126	.012
Social Risk Taking					1	.093	.211*	.253*	.415***
Ethical Risk Taking						1	.242*	.424**	.143
Financial Risk Taking							1	.215*	.220*
Health Risk Taking								1	.366***
Recreational Risk Taking									1

c) Mandarin-speakers (*N* = 74)

	Ego- Moving	IPC- Internality	IPC- Powerful Others	IPC- Chance	Social Risk Taking	Ethical Risk Taking	Financial Risk Taking	Health Risk Taking	Recreation Risk Taking
Ego-moving	1	-.137	.029	.035	.096	.038	.156	.065	.038
IPC-Internality		1	-.206+	-.176	.018	-.051	.066	-.152	-.007
IPC-Powerful others			1	.745***	-.390***	.344**	-.128	-.059	-.251*
IPC-Chance				1	-.298**	.319**	-.038	.021	-.200+
Social Risk Taking					1	.033	.089	.151	.228+
Ethical Risk Taking						1	.203+	.408***	.179
Financial Risk Taking							1	.344**	.367**
Health Risk Taking								1	.373**
Recreational Risk Taking									1

Appendix I

Effect Sizes Across Studies

Table I1. Effect sizes (Cohen's *d*) of psychological distance responses across studies based on (a) between-cultures comparisons and (b) within-culture comparisons.

a) Between-cultures comparisons

Study	<i>N</i>	Measure	Effect size (<i>d</i>)	CI (95%)	Average <i>d</i> Within Study
Study 1	233	Past	0.25 ⁺	(-0.01, 0.51)	0.06
		Future	-0.13	(-0.39, 0.13)	
Study 2	101	Past	0.55 ^{**}	(0.15, 0.95)	0.31
		Future	0.07	(-0.32, 0.46)	
Study 5	181	Past	-0.08	(-0.37, 0.21)	0.19
		Future	0.46 ^{**}	(0.16, 0.75)	
Average Weighted Effect Size					0.15

⁺ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$

b) Within-culture comparisons

Study	<i>N</i>	Measure	Effect size (<i>d</i>)	CI (95%)	Average <i>d</i> Within Study
Study 1	233	English (<i>n</i> =135)	0.39 ***	(0.18, 0.66)	0.06
		Mandarin (<i>n</i> =98)	-0.28 **	(-0.54, 0.02)	
Study 2	101	English (<i>n</i> =57)	0.34 *	(-0.05, 0.69)	0.23
		Mandarin (<i>n</i> =44)	0.11	(-0.30, 0.54)	
Study 5	181	English (<i>n</i> =91)	0.34 **	(-0.62, -0.03)	0.23
		Mandarin (<i>n</i> =90)	0.11	(-0.17, 0.41)	
Average Weighted Effect Size					0.15

* $p < .05$. ** $p < .01$. *** $p < .001$

Note: Effect sizes were computed based on the extent to which they fit this thesis predictions.

In Table (a), for the “past” measure, a *positive* effect size sign indicates that Mandarin-speakers felt closer to the past than English-speakers whereas a *negative* sign indicates that English-speakers felt closer to the past than Mandarin-speakers. For the “future” measure, a *positive* sign indicates that English-speakers felt closer to the future than Mandarin-speakers whereas and a *negative* sign indicates that Mandarin-speakers felt closer to the future than English-speakers).

In Table (b), for English-speakers, a *positive* sign indicates that they felt closer to the future than the past whereas a *negative* sign indicates that they felt closer to the past than the future. For the Mandarin-speakers, a *positive* sign indicates that they felt closer to the past than the future whereas a *negative* sign indicates that they felt closer to the future than the past.

Table 12. *Effect sizes (Cohen's d) of time metaphor responses across studies based on between-cultures comparisons*

Study	N	Effect size (d)	CI (95%)
Study 1	233	2.11 ***	(1.78, 2.42)
Study 5	183	3.35 ***	(2.89, 3.78)
Study 6A	205	3.44 ***	(3.00, 3.86)
Study 6B	162	1.73 ***	(1.36, 2.08)
Average Weighted Effect Size		2.67	

*** $p < .001$

Note: Effect sizes were computed based on the extent to which they fit this thesis predictions. A positive sign indicates that English-speakers were more likely to use ego-moving metaphor compared to Mandarin-speakers.

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