



# Cultural Influences on the Development of Children's Memory and Cognition

Hongyuan Qi, Kim P. Roberts\*

Wilfrid Laurier University, Waterloo, ON, Canada

\*Corresponding author: e-mail address: kroberts@wlu.ca

## Contents

1. The broad picture of culture and cognition	184
2. Development of memory and cognition in children	186
2.1 Episodic memory	187
2.2 Role of parenting style and collective reminiscing	190
2.3 Temporal and spatial understanding	192
3. Memory processes	194
3.1 Memory encoding	194
3.2 Memory reconstruction	196
4. Methodological issues	198
4.1 Controlled experiments on memory	198
4.2 Language	204
5. The dynamic nature of culture in the 21st century: Changing societies	207
5.1 Shifts toward individualism	207
5.2 Attitudes regarding parenting styles	210
5.3 One-child policy	212
5.4 Urban vs rural contexts	213
6. Applied implications	214
6.1 Forensic arena	214
6.2 Immigrants and asylum-seekers	215
7. Conclusion	216
References	217
Further reading	224

## Abstract

Memory is socially constructed. The types of information that children pay attention to and remember, as well as how children organize and recall their memories can differ as a function of sociocultural background. This chapter presents an overview of cultural variations on children's memory and cognition. We draw attention to the necessity of conducting controlled experiments to examine cultural differences in the specific

processes involved in episodic memory (e.g., encoding, retention, discrimination skills). We highlight potential challenges (e.g., language, measurement equivalence) that researchers need to overcome to conduct valid cross-cultural research. In light of cultural transformations in recent decades, we outline promising avenues for future research as well as the applications of this research to important issues for forensics and immigrants and asylum-seekers.

Over the past decades a growing research trend is to investigate the influences of culture on specific aspects of children's memory, including autobiographical memory, event memory, earliest childhood memory, childhood amnesia, visual-spatial memory, and working memory (e.g., Han, Leichtman, & Wang, 1998; Klemfuss & Wang, 2017; Peterson, Wang, & Hou, 2009; Rogoff & Waddell, 1982; Wang, 2004, 2006). Results from these studies have documented that children tend to view, remember, and recall through cultural lenses. The current state of cross-cultural literature shows that most studies have focused on autobiographical memory. However, other memory processes have not been extensively examined (e.g., encoding, reconstruction, and retrieval). In this chapter, we draw on empirical studies and our recent findings to present a comprehensive picture of the dynamic influences of cultural background on children's memory and cognition.

First, we discuss general differences in values and beliefs between East Asian and Western societies. Next, we focus on the development of children's memory and cognition in cultural context. Then, we present challenges that cross-cultural researchers may encounter due to language differences, methodological constraints, as well as shifts in social structure and cultural values. We conclude with implications and future directions for cross-cultural research.



## 1. The broad picture of culture and cognition

The notion that memory is socially patterned is evidenced in research conducted over the last eight decades (e.g., Bartlett, 1932; Han et al., 1998; Peterson et al., 2009; Rogoff & Mistry, 1985). Bartlett (1932), for instance, in his seminal work examined various aspects of participants' recollections (e.g., omissions and the style of reproduction and reorganization) of a given story after brief (20 h) and longer delays (8 days). Bartlett found that participants tended to reproduce the story in ways that fell in line with their inherent characteristics (e.g., attitudes, beliefs, and tastes); these internal

tendencies are dominantly shaped by individuals' social groups. Scholars have suggested that remembering is sensitive and adaptive to the demands of the social environment in which one is embedded (Nelson & Fivush, 2004; Rogoff & Mistry, 1985). In Bronfenbrenner's (1977) "social ecological" system, he listed five systems ranging from one's microenvironment to macrolevel factors (the Microsystem: family, peers, and school; the Exosystem: neighbors and mass media; the Macrosystem: culture) to elucidate the multifaceted and bidirectional nature of social influences on human development. Thus, social and cultural factors, such as parenting and schooling, as well as broader cultural ideologies ultimately shape what and how children tend to remember and recall.

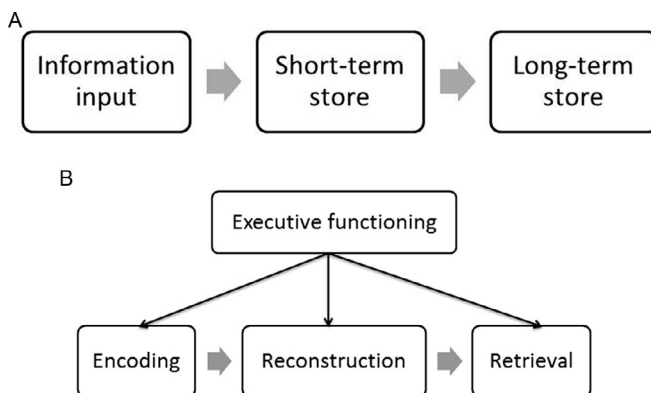
We conceptualize culture as a dynamic construct that encompasses both *symbolic* and *behavioral* aspects (Hofstede, 1984; Markus & Kitayama, 2010; Shweder et al., 2006). The *symbolic* aspect consists of the culturally shaped ideas and understandings pertaining to people, society, nature, and spirituality. For example, North American culture facilitates individuals' free will to pursue their own happiness and desire. The *behavioral* aspect constitutes the culturally institutionalized pattern of lifestyle and social practices. For example, young people in China are obligated to take care of elder family members, whereas those in Western societies tend to make conscious decisions about whether and how to care for seniors. This reflects that compared to Westerners, Chinese people hold fast to the virtue of filial piety, which subsequently informs their socialization practices and lifestyles. In a very broad sense, East Asian culture orients toward collectivism and places great emphasis on interdependence and collective goals in lieu of individual needs and desires. Western societies, in contrast, are generally dominated by individualist values that prioritize autonomy and agentic goals instead of group benefits and outcomes (Markus & Kitayama, 1991; Yao, 2000). This early dichotomy of collectivist and individualistic cultures has been replaced by more dynamic conceptions of culture. For example, there are nuanced within-group variations, such that the extent to which individuals within the same country internalize their cultural values may vary substantially (Markus & Hamedani, 2007). It is also worthwhile to examine what aspects of human cognition are culturally invariant (e.g., increases in cognitive ability with age for abstraction regardless of cultural background), and what are culturally situated. Nevertheless, prior literature has well established that individuals from different cultures hold values and beliefs that systematically differ such that cultural background is an appropriate criterion to compare between-group variations (Leichtman, Wang, & Pillemer, 2003).



## 2. Development of memory and cognition in children

More than 50 years ago, [Atkinson and Shiffrin \(1968\)](#) proposed a multistore model of the information-processing system as a guide for understanding how people think. Initially a “black box” linear model of memory (see [Fig. 1A](#)), the model developed over time as it became clear that we are not *passive* recipients of information but actively apply various *cognitive operations* to perceived information. In this classic model, *memory* comprises *encoding* (i.e., information to the brain), *executive functioning* (e.g., bringing to mind-related information), *reconstruction* (e.g., reorganizing the encoded information according to individualized schemas), and *retrieval* (see [Fig. 1B](#); bringing stored information to one’s consciousness; [Bartlett, 1932](#); [Tulving, 2002](#)).

The self as an active agent is an inextricable part of one’s memory formation and production ([Tulving, 2002](#)). The relations among culture, self, and memory are conceived as multidirectional, complex, and dynamic as illustrated in [Fig. 2](#) ([Conway, 2005](#); [Tessler & Nelson, 1996](#)). Specifically, self-constructs are contingent on the social environment, an idea initially suggested by [Cooley \(1956\)](#). Therefore, individuals in largely collectivist societies, such as East Asians, are more likely to construct an interdependent self-view, whereas those who live in a society that values individualist philosophies would tend to form an independent self-view. Although this is an overgeneralization, one’s self-view could direct the remembering processes by informing individuals what information to encode and how to make



**Fig. 1** (A) The symbolic representation of memory. (B) The pathway of memory processes.

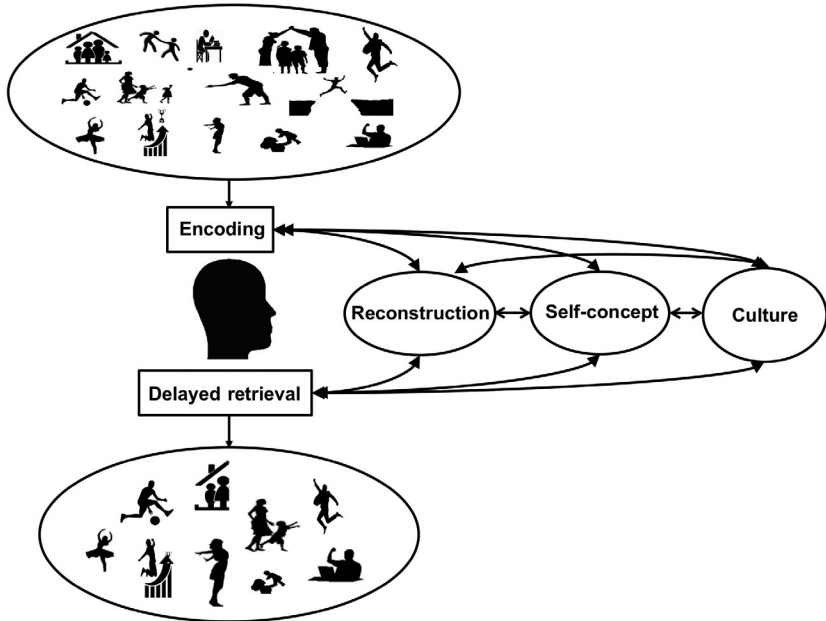


Fig. 2 The dynamic interactions between memory processes, self, and culture.

sense of the encoded events, thereby shaping the content and style of later retrieval. The conditioned patterns of memory recollections, in turn, reinforce one's self-view, guiding behaviors and subsequently shaping cultural patterns (Markus & Hamedani, 2007; Markus & Kitayama, 2010). Culture, self, and memory processes mutually constitute each other and form an interactive and dynamic system. Therefore, it is reasonable to assume that East Asian children, for example, would be more likely to encode, reconstruct, and recall experienced events that reflect interpersonal connectedness compared to their American counterparts who would tend to focus more on self-oriented aspects of the event. As we will discuss later (see Sections 4 and 5), the relation between culture and memory is more complex than a simple dichotomy, but research in this area provides a rich and naturalistic environment to discover how memories form and change with respect to cultural factors.

## 2.1 Episodic memory

Endel Tulving is widely acknowledged for bringing attention to memories of individual *episodes* vs general memories such as knowledge, or how to perform an action sequence (Tulving, 2002). *Autobiographical* memory refers to

one's episodic memory of specific, experienced events (e.g., *when* and *where* the event occurred; *what* and *who* are involved) (Nelson & Fivush, 2004; Wang, 2011).

Accurate episodic memory requires that features of the event, such as when and where, are bound together to form a discrete episode (Roberts, Evans, & Duncanson, 2016). However, individual episodes (events) also need to be discriminated from each other; otherwise one forms a *general* script of similar events (e.g., remembering what normally happens without accurate identification of individual events) (Brubacher, Roberts, & Powell, 2011, 2012, Roberts, 2002).

Young children find it particularly difficult to remember a single episode of a repeated event. In one study, 4- to 5-year-olds and 7- to 8-year-olds participated in a classroom event on four different occasions (Brubacher, Glisic, Roberts, & Powell, 2011). Each of the four occurrences had the same structure and activities (e.g., doing a puzzle, counting) but with varying alternatives for the specific activities and items presented (e.g., there could be a different puzzle for each of the four occasions). When asked to recall a specific occasion, children confused details across occurrences, such as claiming that they did a puzzle of a clown on the first day when they did it on the second occasion. The 4- to 5-year-old children were less accurate than the 7- to 8-year-olds. In fact, preschool children (younger than age 6) consistently confused specific details across occurrences (Brubacher et al., 2012; Brubacher, Earhart, Roberts, & Powell, 2018; Connolly & Lindsay, 2001; Danby, Brubacher, Sharman, Powell, & Roberts, 2017; Farrar & Goodman, 1992). In sharp contrast, children find it easier to recall *generally* what happens (e.g., Brubacher et al., 2012).

One reason to explain why young children find it difficult to accurately retrieve an episode of a repeated event is that they do not *bind* what happens in an episode with its source. Children confused two separate events with a photographer unless the episode and its source were explicitly mentioned (Roberts, Evans, et al., 2016). For example, in one episode, the photographer was dressed as a doctor and as a cowgirl in the other episode. Children more accurately attributed the details of each episode (therefore, confusing them less) when the photographer made statements out loud such as "Remember that you wore a badge *the time I was a doctor.*" Thus, the item "badge" was clearly linked to the source (the doctor time). In other research, there is a clear developmental progression in children's relational memory (combining what and where), as well as their ability to separate patterns (a test of discrimination, Ngo, Newcombe, & Olson, 2018), from about

the age of 4 years. Interestingly, Ngo and colleagues did not find performance on the relational and discrimination tasks to be correlated, suggesting that there are different developmental trajectories for each type of memory (Ngo et al., 2018).

Research on children's memories across cultures has revealed some factors that drive children's episodic memory recall. Most research has involved children recalling autobiographical memories (events from their personal past). Specifically, researchers have systematically examined how children's memory recall differs as a function of culture by eliciting spontaneous narratives pertaining to their experienced events (e.g., Han et al., 1998; Peterson et al., 2009; Wang, 2004, 2006, 2007; Wang, Hutt, Kulkofsky, McDermott, & Wei, 2006). These studies have yielded consistent findings that whether children are in a predominate collectivist or individualist context has profound influences on the content, style, and specificity of their autobiographical recollections. For instance, in a study conducted by Han et al. (1998), Chinese, American, and Korean children aged 4–6 years were asked to recount events that they had personally and recently experienced. They found that Chinese and Korean children reported fewer temporal markers (e.g., first, next, and if-then), descriptive and specific details than American children. In addition, Asian participants' reports contained more information regarding other people and less about their internal state (e.g., feelings and preferences) compared to their American counterparts. Peterson et al. (2009) compared older Chinese and Canadian children's (8, 11, and 14 years old) recall of their early memories. Results showed that Canadian children recounted significantly more early memories and dated their memories earlier compared to Chinese children. Regarding memory content, consistent with Han et al.'s (1998) findings, Chinese children's memories were predominated by social-centered events (e.g., celebrate holiday with family), whereas self-centered events (e.g., solitary play) were more prominent in Canadian children's reports. This pattern of cultural variations in children's memory recall is also evident in studies conducted with adults (e.g., Wang, 2001).

However, cross-cultural research on children younger than 4 years old is relatively rare (Wang, 2006; Wang et al., 2006), and the reported cultural differences are less pronounced as compared with studies of older children (e.g., Han et al., 1998; Peterson et al., 2009). Wang (2006), for instance, found cultural differences in the volume of 3-year-old children's recalled memories. Specifically, Euro-American 3-year-olds spontaneously retrieved more details of their previous experiences when they were interviewed

alone and conversed with their mother compared to Chinese children. Similarly, results from Wang et al.'s (2006) study showed that 3-year-old Euro-American children reported more specific and general details in their reports than did their Chinese counterparts. However, the content of children's memories (e.g., social-oriented information) did not vary significantly with culture. Despite structural differences between Chinese and English languages, compared to older children, 3-year-olds may have limited ability to acquire language, as well as express their thoughts and recount experienced events. This could preclude researchers from finding significant cultural differences in memory content. In summary, there is converging evidence demonstrating that, compared to children of European heritage, Asian children generally tend to report life events in a skeleton style such that they are less likely to "flesh out" their recollections with specifics, descriptives, and self-oriented information.

## 2.2 Role of parenting style and collective reminiscing

What could account for such thematic and stylistic variations between Eastern and Western children's autobiographical memory? Scholars have suggested that the style of parent-child interactions plays a significant role in children's memory (Nelson & Fivush, 2004). Autonomy and interpersonal connectedness are both essential elements in children's development (Greenfield, Keller, Fuligni, & Maynard, 2003) although research shows that the importance of each varies between cultures. Specifically, given the distinct cultural meanings, parents from different communities interact with their children in culturally specific ways. For example, Japanese caregivers show sensitivity and responsiveness to their infants by prioritizing social interactions and emotional attachment. In contrast, US caregivers conceptualize sensitivity and responsiveness as giving precedence to infants' autonomous needs and foster individuality (Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000). Thus, Asian parents concentrate more on imparting moral lessons to their children through strict discipline, while Western parents are more likely to prioritize independence by encouraging children's autonomous expressions and decisions, and by providing support and warmth (i.e., authoritative parenting).

According to Chao (1994), Confucian ideologies focus on establishing hierarchical social relationships and demand that parents train their children to become socially competent individuals. This could lead Chinese parents to ingrain the idea that exerting control over their children's life and choices



are essential in their parenting practices. Indeed, due to Chinese parents' emphasis on social relationships and group harmony, compared to Euro-American children, Chinese children are more likely to make decisions based on social consensus (DiYanni, Corriveau, Kurkul, Nasrini, & Nini, 2015). As children actively engage in their cultural context through shared activities, they gradually accrue culturally desired values, thoughts, feelings, and knowledge that collectively shape their mental experiences, which would, in turn, guide their memory processes and behaviors (Markus & Kitayama, 1991; Shweder et al., 2006; Triandis, 1989).

Leichtman et al. (2003) listed four pathways (i.e., narrative environments, culturally directed self-construction, emotion knowledge, and beliefs about autobiographical memory) through which culture influences children's recall of autobiographical events. One of the most frequently examined pathways is examining children's narrative environments by studying *parent-child joint reminiscing*; in other words, observing how parents and their children discuss a past event that they shared. The content of children's memories of an event is consistently influenced by their parents' style of reminiscing. For almost all research in this area the parent is usually the mother.

According to Nelson and Fivush (2004), the level of elaboration of mothers' reminiscing style is positively associated with the elaboration and coherence in children's organization and retrieval of their autobiographical memories. Through shared conversations, children gradually develop the sense of the past as well as the continuity of the self in the past and the present. Mothers' elaboration when discussing a past event with their children influences the content and specificity of children's memory. A high-elaborative style reflects the structure and support provided by mothers when reminiscing. For example, a high-elaborative mother will request details from their child by asking open-ended recall questions (e.g., *what happened?*), describing details not mentioned by the child, and acknowledging their children's memories. Low-elaborative mothers tend to provide less structure and give sparse details when describing events. Research with mother-child dyads in the United States has consistently found that high-elaborative mothers have children who give coherent and detailed narratives of autobiographical events (e.g., Jobson, Burford, Burns, Baldry, & Wu, 2018; Leichtman, Pillemer, Wang, Koreishi, & Han, 2000; Reese & Newcombe, 2007).

General parenting style also influences children's narratives. Galindo and Harris (2017) found that items that were disputed during parent-child

reminiscing and were resolved in favor of the mother were less likely to be remembered accurately. Thus, highly authoritarian mothers who are strict (more likely in Asian countries) and mothers who are more authoritative, for example, by setting boundaries, providing reasons for unwanted behavior, and allowing children to err but supporting them (more likely in Western countries), may correlate with children's narrative style in different cultures. The way that mothers address emotions, especially negative ones, may also vary across cultures. In one study, mothers who were sensitive to their children after they experienced an event that scared them were more able to engage their children later when discussing negative emotions (Reese, Meins, Fernyhough, & Centifanti, 2018).

Studies comparing reminiscing styles of families in different cultures partly provide support for these hypotheses about parental reminiscing style. These studies have consistently shown that European mothers employ storytelling reminiscing style that is embellished with details and open-ended prompts, while Chinese mothers often engage in test-like conversation style that is less elaborate and contains more closed-ended questions (Mullen & Yi, 1995; Wang, 2006, 2007). The maternal conversation style could also influence children's autobiographical memory by determining what information ought to be remembered, richly represented, and highly accessible after delays. Therefore, Chinese children's low-elaborative and social-oriented memory recollections could be partially accounted for by their mothers' low-elaborative, goal-directed, and social-guided narrative style.

### 2.3 Temporal and spatial understanding

Episodic memories are unique in that they are tied to a specific *context* or source (Roberts, Evans, et al., 2016; Roberts, Qi, & Zhang, 2016). Thus, understanding how children develop the ability to provide information that makes references to time, place, and other unique contextual information can reveal how they gradually become able to differentiate a specific instance from a general set of events. Our understanding of "typical" temporal understanding comes from research with North American children.

There are clear developmental increases in children's ability to provide temporal information (Friedman, 1992). Children younger than 8 years can have difficulties providing instance-specific information as they are still developing knowledge of temporal terms and a general sense of time (Friedman, 1992). Further, in contrast to memories of details observed during an event, the concept of time is more abstract and less tangible. Children

develop knowledge of time patterns gradually using different time scales. Friedman (1986, Experiment 1) found that the relative orders of days of the week could not be accurately judged until fourth grade, while fifth graders could also judge months in the year (Experiment 2). Bauer, Burch, Scholin, and Güler (2007) found that 7- to 10-year-olds were highly accurate in judging their age and the relevant season of self-nominated *autobiographical* memories, and that 6- and 8-year-olds (but not 4-year-olds) accurately judged the order of two autobiographical events (Pathman, Larkina, Burch, & Bauer, 2013). Thus, children reach adult competency somewhere between the ages of 8 and 10.

Spatial memory and reasoning for an episodic event also develop throughout childhood. Lambert and colleagues placed a treat under a red cup, while there were no treats in 19 other cups. The cups were randomly distributed. When children were asked to retrieve the treat in a white-cup only array, they could only find the treat efficiently if they were able to recall the spatial position of the red cup in the first task. In general, spatial performance improved in children from 3.5 to 7 years of age. In subsequent trials, the older children were better able to attend to and selectively use their memories of the encoding trial that was *immediately before* the test trial (i.e., executive function skills), whereas younger children tended to fixate on a location from an encoding-test trial that happened earlier. Interestingly, performance within the 5-year-old group showed more variation because some of these children performed like adults, while the rest mirrored the younger children (Lambert, Lavenex, & Lavenex, 2017). Highly similar results have been found in tests of temporal memory. In a study using a visual timeline to help children report when in the day events occurred, Gosse and Roberts (2014) found that the timeline helped 7- to 8-year-olds specify when events occurred more than it helped the 4-year-olds. However, children aged between these two groups showed the same variation that Lambert et al. (2017) found with some 5- to 6-year-olds performing as accurately as their parents and others not.

There have been very few cross-cultural investigations into temporal and spatial memory abilities despite the presence of clear cultural differences in episodic memory. Haun and colleagues examined spatial cognition in Dutch and Namibian 7- to 11-year-olds. These children were presented with simple arrays of toys (e.g., three cows in a row and asked to memorize the arrays and then reproduce them at another location. Dutch children tended to reproduce the arrays from an egocentric perspective using left/right as their own frame of reference, while the Namibian children preserved

the North/South cardinal directions of the original stimulus (i.e., a geocentric response). Thus, children from these two cultures used distinct frames of reference when required to use spatial memory. Further, the preferred strategies were closely aligned with predominant language preferences in each culture (e.g., the words *north* and *south* are the predominant spatial descriptions in the Akhoe Hai||om language of Namibia; Haun, Rapold, Janzen, & Levinson, 2011).

In one other study, preschoolers from the United States and Israel were given a spatial search task in which they were asked to utilize verbal labels (letters of the alphabet) to match the hiding locations of two monkeys (McCrink, Shaki, & Berkowitz, 2014). The labels were taught to the children in either a left-to-right (English style) or a right-to-left (Hebrew style) fashion to assess whether performance on this task is affected by directionality of labeling. As expected, English-speaking children performed better on the spatial search task when locations were labeled in a left-to-right fashion, while Hebrew-speaking children exhibited higher performance when labels were taught in a right-to-left fashion. Thus, one's cultural context is tightly bound to our cognitive processes.



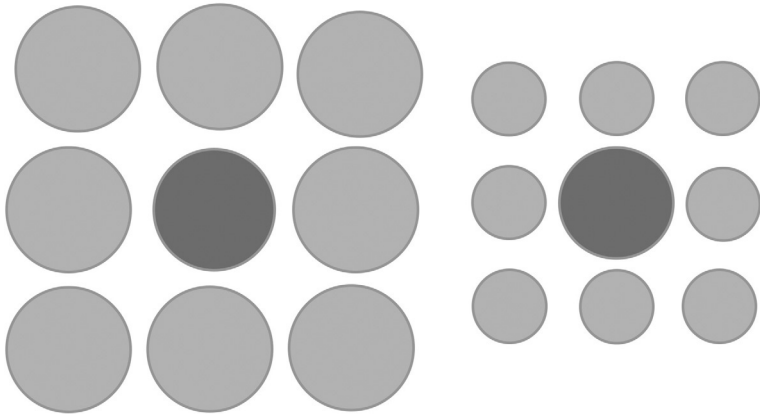
---

### 3. Memory processes

Earlier, we described the stages involved in the encoding of events and subsequent retrieval of memories of those events. In this section we look more closely at these different aspects of memory to answer questions such as *What drives cultural differences in memories—the encoding at the time of the event or the way it is retrieved?*

#### 3.1 Memory encoding

Research on attention and perception shed light on cultural variations in memory encoding. For example, Imada, Carlson, and Itakura (2013) examined cultural differences in context sensitivity by asking 4- to 9-year-old Japanese and American children to complete the Ebbinghaus illusion task and a free-recall test about a series of pictorial scenes that they had previously viewed. In the Ebbinghaus illusion task, target circles are surrounded by other circles that are either larger or smaller. As shown in Fig. 3, the actual size of the target circle on the left is slightly larger than that on the right. If children pay close attention to the contextual information, they would tend to perceive the left circle as smaller than the actual size because it is



**Fig. 3** An example of the Ebbinghaus illusion task. . In Imada and colleagues' experiment, they varied the size of the right target circle throughout the trial. *This figure was created based on the figure in Imada, T., Carlson, S. M., & Itakura, S. (2013). East–West cultural differences in context-sensitivity are evident in early childhood. Developmental Science, 16(2), 198–208. doi:10.1111/desc.12016.*

surrounded by larger circles. They would also perceive the right circle as larger than the actual size because it is surrounded by smaller circles. As a result, they would have the illusion that the left circle is smaller than that on the right. Results from this task showed that Japanese children were more likely to be influenced by the contextual information when making judgments (i.e., greater tendency to show illusion) compared to their American counterparts. Similar results were found when children recalled the visual scenes. Compared to American children, Japanese children were more likely to report background objects first and their memory reports also contained more background details. Other perceptual and attentional research in children also showed a similar pattern of results (e.g., Kuwabara & Smith, 2012; Oishi et al., 2014).

To our knowledge, no studies have examined the underlying mechanisms that could explain such cultural influences on the attentional and perceptual processes in children. However, Chua, Boland, and Nisbett (2005) research with adult participants could provide insight to this issue. Specifically, Chua et al. (2005) presented Chinese and Euro–American participants with different scenes and examined their eye movements while gazing at the visual target. They found that Chinese participants fixed their eyes slower and maintained their eye gaze less on the focal objects than the background compared to Euro–American participants. Based on these findings, researchers posited that Asians, in general, tend to adopt a holistic cognitive

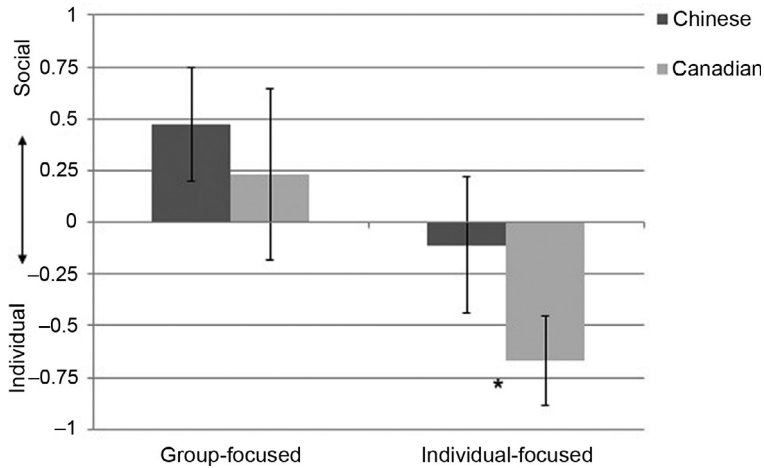
style and thus are sensitive to changes in the environment and pay close attention to the broad context. As influenced by Ancient Greeks' emphasis on personal agency, Westerners tend to view the self to be separated from the environment and adopt an analytical cognitive style, and therefore focus more on individual objects (Imada et al., 2013; Kuwabara & Smith, 2012; Nisbett, Peng, Choi, & Norenzayan, 2001; Varnum, Grossmann, Kitayama, & Nisbett, 2010). There is a paucity of developmental research in this area. Nevertheless, results from these adult studies suggest that children's cultural background could have profound influences on their memory formation processes, which could account for the distinctive styles of recollections observed between children from different communities. In the next section, we discuss the larger empirical base on developments in children's memory reconstruction.

### 3.2 Memory reconstruction

Memory is reconstructive—we do not retain exact digital copies of memories. Rather, our memories are shaped and formed by experiences before and after an event. Existing systems of knowledge and beliefs (i.e., schemas) help organize perceived events and fill in gaps to make memories congruent with the schema (Bartlett, 1932). Although the process of reconstruction may lead to memory distortion and error, “a thorough understanding of memory's errors will provide insight into the processes that normally aid memory” (Marsh, Eslick, & Fazio, 2008, p. 235).

In Domino and Hannah (1987) and Wang and Leichtman (2000) research, children (5–6 years old, and 6–13 years old, respectively) were asked to create their own stories based on given information to examine cultural differences in narratives. Findings from both studies revealed that the same story stems elicited more social-oriented information from Chinese children and more self-oriented information from American children. These findings imply that culture can shape how children reconstruct the incoming information. Given Chinese children's collective self-constructs, they are therefore more likely to remember and organize their perceived events in a social-oriented manner as compared with their American counterparts who are more likely to process perceived information in ways that reflect their individuality.

Findings from one of our own studies revealed a similar pattern (Qi & Roberts, 2017). Specifically, we examined 8-to-9-year-old Chinese and



**Fig. 4** Index scores of spontaneous intrusions in children's delayed recall as a function of Cultural background and Event focus. Error bars: 95% CI. \* $P < 0.05$ .

Canadian children's memory intrusions by assessing participants' delayed retrieval of a target story. We found that compared to Canadian children, when the events in question focused on individualistic activities, Chinese participants were more inclined to fabricate *social-themed* details in their memory report (see Fig. 4). For instance, in the individual-focused events, the protagonist was playing alone on the Bouncy castle and Rollercoaster, and Chinese children might feel it was odd that her parents were not with her, so they confabulated details such as "her parents went to the bank" and "her parents were looking at her and cheering her up," to embellish and make sense of their memories. These findings suggest that Chinese children are more likely to organize their memory in a social-oriented way compared to their Canadian counterparts.

We were able to isolate encoding and retrieval processes in our study on Chinese and Euro-Canadian children's immediate and delayed recall of a story (Qi & Roberts, 2017). The story comprised both individual-focused (e.g., emotions and preferences) and social-focused (e.g., helping others) scenarios. Compared to Euro-Canadian children, we found Chinese children accurately reported more social-focused information both at the time of memory encoding (i.e., immediately after watching the target story) and at delayed retrieval (i.e., after 1 week's delay).

However, Qi and Roberts (2017) only examined children's memory after a short interval (5–7 days). Little is known about how children's

memory reconstruction process would differ as a function of culture over the long term and what factors could account for such cultural variations. As shown earlier, for example, maternal reminiscing style shapes children's memory retrieval (e.g., Mullen & Yi, 1995; Wang, 2006, 2007), which could also structure children's memory reconstruction. This research question needs to be addressed more fully in a longitudinal study (Wang, 2009) and using a controlled design.



## 4. Methodological issues

### 4.1 Controlled experiments on memory

In general, cross-cultural research on autobiographical memories has set a foundation for the understanding and examination of how cultural contexts shape the content and style of children's recollections in naturalistic settings. Scholars have also assessed the accuracy of children's autobiographical recall by examining whether parents' recollections of a specific event would corroborate children's retrieval of the same event (Wang, Peterson, & Hou, 2010; Wang & Song, 2017). However, because individuals choose their own episodes to report, there may be significant variation between individuals' autobiographical memories regarding the time that has elapsed since the event, the salience and familiarity of the experienced event, as well as the extent to which others were involved. This variation could distort interesting patterns about the relation between memory and culture. Moreover, what exactly the child has experienced was often unknown to the researchers and thus the accuracy of the remembered information cannot be assessed. Our understanding of the memory-culture relation would be enhanced by investigating whether cultural background influences other aspects of children's memory, such as accuracy and organization of memories about events to which researchers are privy. Therefore, laboratory experiments with adequate control of extraneous factors are warranted. However, as shown in Table 1, most research has focused on examining cultural influences on children's narrative environment, earliest memory, and other cognitive processes (e.g., working memory and executive function). To the authors' knowledge, few studies have used both a controlled design and a cross-cultural sample to investigate the effects of culture on children's memory (Domino & Hannah, 1987; Han et al., 1998; Klemfuss & Wang, 2017; Rogoff & Waddell, 1982; Wang & Leichtman, 2000). Investigations of memories of staged events will nicely complement the research on autobiographical memories.



**Table 1** Recent literature on cultural differences in memory using more diverse samples  
**Autobiographical memory**

Study	Cultural group	Age (in years)	Measured variables
Harpaz-Rotem and Hirst (2005)	Traditional Kibbutz vs typical Israeli members	24–28	Earliest memory
Fitzgerald (2010)	Black vs White American	19–22	Earliest memory
Bender and Chasiotis (2011)	Chinese, African, and European (Germany)	20–40	The influences of siblings on earliest childhood memories
Chen, McAnally, and Reese (2013), Chen et al. (2013)	New Zealand Chinese vs New Zealand European	Study 1: 8–12 Study 2: 12–21	Episodic memory
Sahin and Mebert (2013)	Turkish vs American college students	19–21	Earliest childhood memory A significant childhood memory Self-construal
Artioli, Reese, and Hayne (2015)	Mother–child dyads from Nuclear vs non-nuclear families in New Zealand	7–11	Children’s earliest memory Mother–child conversations
Aviezer, Sher-Censor, and Stein-Lahad (2017)	Traditional Kibbutz vs typical Israeli members	36–39	Earliest memory Parenting style
Göz, Çeven, and Tekcan (2017)	Urban vs Rural children from Turkey	10–13	Earliest memories
Reese, Hayne, and MacDonald (2008)	Indigenous New Zealand (Māori) vs European New Zealand mother–child dyads	3–4 and 7–8	Maternal narratives
Sahin-Acar and Leichtman (2015)	Eastern and Western Turkish, and US mother–child dyads	3–5	Mother–child conversations Mothers’ self-construal
Reese and Neha (2015)	Māori mother–child dyads from New Zealand	3 to 5	Mothers’ reminiscing practices Mother–child conversations Children’s language

*Continued*

**Table 1** Recent literature on cultural differences in memory using more diverse samples—cont'd

<b>Other cognitive processes</b>			
<b>Study</b>	<b>Cultural group</b>	<b>Age (in years)</b>	<b>Measured variables</b>
Niraula and Mishra (2001)	Rural vs urban Nepalese children	5–6, 8–9, and 11–12	Memory for objects and spatial location
Conant et al. (2003)	Lao vs American children	4–12	Auditory verbal and visual memory span
Santos, Mello, Bueno, and Dellatolas (2005)	Rural vs urban Brazilian children	7–10	Visual memory
Shebani, van de Vijver, and Poortinga (2008)	Libyan vs Dutch children	8–10	Memory span and rehearsal
Nampijja et al. (2010)	Semiurban Ugandan children	4–6	Working memory General cognitive abilities
Malda, van de Vijver, and Temane (2010)	Urban Afrikaans, urban and rural Tswana children	9	Working memory, short-term memory, attention, and other cognitive abilities
Tsethlikai (2010)	American Indian children	7–12	Memory construction
Alansari and Soliman (2012)	Kuwait vs Egyptian children	10	Working memory
Chrysochoou, Bablekou, Masoura, and Tsigilis (2013)	Greek-speaking children from Greece	5.5–9.5	Verbal short-term memory and working memory
Thorell, Veleiro, Siu, and Mohammadi (2013)	Hong Kong Chinese, Iranian, Spanish, and Swedish children	6–11	Executive functioning Academic achievement
Shahabi, Abad, and Colom (2014), Shahabi, Ejei, Azadfallah, and Farzad (2014)	Iranian children	8–12	Working memory Fluid intelligence
McCrink et al. (2014)	Children from Israel and the United States	3–5	The effects of spatial bias on memory

**Table 1** Recent literature on cultural differences in memory using more diverse samples—cont'd

<b>Other cognitive processes</b>			
<b>Study</b>	<b>Cultural group</b>	<b>Age (in years)</b>	<b>Measured variables</b>
Shahabi, Abad, et al. (2014), Shahabi, Ejei, et al. (2014)	Iranian children	10–12	Short-term memory Working memory capacity Executive function Fluid intelligence
Giofrè, Mammarella, and Cornoldi (2014)	Italian children	9	Working memory Geometry Intelligence
Norimatsu, Blin, Hashiya, Sorsana, and Kobayashi (2014)	Japanese vs French children	1–3	Theory of mind
Catale, Meulemans, and Thorell (2015)	Belgian French-speaking vs Swedish children	8–11	Working memory Inhibition
El Asam and Samara (2015)	Arab children from Israel	9–10 and 11–12	The effectiveness of Cognitive Interview on children's delayed retrieval of the target stimuli
Medeiros, Torro-Alves, Malloy-Diniz, and Minervino (2016)	Brazilian children	10–11	Executive function
Stevenson, Heiser, and Resing (2016)	Indigenous Dutch vs ethnic minority Dutch children	8	Inductive reasoning Analogical reasoning Working memory
Spiegler and Leyendecker (2017)	Turkish–German immigrant children	11	Executive function
Rosenqvist et al. (2017)	Children from Finland, Italy, and the United States	3–15	Face memory Language Emotion recognition Theory of mind Visuospatial processing
Alloway et al. (2017)	Children from Argentina, Brazil, Canada, Italy, and the United Kingdom	5–10	Working memory

Han et al. (1998) not only examined children's autobiographical memory but also assessed story recall. Specifically, children aged 4 and 6 years old watched a fictional story and then recalled the story after a 1-day delay. Findings revealed that children's memory specificity and content (i.e., the ratio of other- to self-related details) were not affected by their cultural background. However, American children reported more temporal markers compared to Korean children. In addition, American children were more likely to regard the story character as having negative emotions (e.g., sad and scared) compared to their Asian counterparts who frequently perceived the character as expressing positive feelings (e.g., happy and good) even in undesirable scenarios (e.g., had to leave while playing). These findings reflect Asian children's tendency to prioritize group harmony and show compliance by avoiding negative expressions that may disrupt interpersonal peace and by accentuating the positive aspects of the event that could facilitate social connectedness (Markus & Kitayama, 1991).

In a recent study conducted by Klemfuss and Wang (2017), 6-year-old Chinese American and Euro-American children participated in a staged event in which they played a "Zookeeper game" by seeing and interacting with different stuffed animals with an experimenter. After 6 months, children provided their narratives of the event in response to the interviewer's open-ended (e.g., *What happened?*) and cued (e.g., *Tell me what happened when you got ready to be the zookeeper*) prompts. Klemfuss and Wang (2017) coded correct and incorrect utterances pertaining to the target activity. For children's free-recall (*what happened?*), no cultural differences were observed; and children's narrative quality (i.e., the number of on-topic details, such as description of objects and temporal markers) significantly predicted the amount of incorrect, but not correct, responses. That is, participants who showed better narrative quality were more likely to provide inaccurate responses (odds ratio = 1.93). Cultural variations emerged in children's responses to the cued questions. That is, Chinese American children reported more correct and fewer incorrect details from the staged event than did Euro-American children. Overall, Klemfuss and Wang explained their results by suggesting that (1) regardless of culture, children's narrative ability is inversely related to memory accuracy because skilled narrators tend to spontaneously incorporate inaccurate information in their narratives for purposes of entertaining and social facilitation; and (2) Chinese children place more stress on memory accuracy compared to Euro-American children, possibly due to Chinese parents' emphasis on academic excellence.

However, memory specificity and content were not examined in [Klemfuss and Wang \(2017\)](#) study as this was not their main research question. Therefore, it is unknown whether children's event memory would also vary with culture on these two aspects (i.e., content and specificity) that have been frequently assessed in research on autobiographical memory (e.g., [Peterson et al., 2009](#)). Future research is needed to address these questions by manipulating the theme of the experimental stimuli (i.e., social- vs individual-focused) and coding for memory specificity to enable researchers to evaluate which themed events are more likely to be remembered, and the specificity of children's event memory, respectively. Additionally, it is unclear how the finding that Chinese children's emphasis on memory accuracy would reconcile with the finding that Chinese children's memory reports generally contain a large number of generic details. In other words, Chinese children may show a different pattern of recall of a staged event or a target story compared to their recall of naturally occurring life events. Specifically, remembering and recounting information presented in the experimental stimuli may lead Chinese children to perceive this as a test, and therefore they tend to focus on remembering correctly given their parents and teachers' emphasis on academic excellence. However, remembering and recalling what they have personally experienced are not always encouraged and facilitated by their parents ([Mullen & Yi, 1995](#); [Wang, 2006](#)), and as a result, they tend to form a skeleton structure of autobiographical events. Therefore, we speculate that cultural differences in memory specificity would be more pronounced when children's autobiographical memory, as opposed to event or story memory, is examined. A promising avenue for future research would be to verify whether there are cultural differences regarding how different experimental designs would affect children's memory recall.

To avoid validity threats, measurement equivalence is an important aspect that researchers who study *development* across childhood need to consider when designing experimental stimuli. Measurement equivalence for memory development in different cultural contexts is especially important ([Peña, 2007](#)). Specifically, participants' perceived salience and familiarity of the content of the stimuli should be equivalent across cultures. [Roberts and Powell \(2006\)](#) examined 6- to 7-year-old Australian children's suggestibility to false information by using a well-established repeated event paradigm. Children participated in a series of activities that contained different target items (e.g., the warm-up activity), and the

instantiation of each target item varied across events (e.g., run and jump as the warm-up activity for the first and second event, respectively). If the repeated events study is to be replicated among Chinese participants, modifications of the target events are necessary to guard against confounding effects resulting from cultural differences in children's perceived familiarity of the event details. For example, some instantiations in the [Roberts and Powell \(2006\)](#) study, such as Kookaburra, Goanna, garbage bag, and ice pack, are not commonly seen or used in some of the cities in China. Therefore, they would need to be replaced with other items that are geographically appropriate. Moreover, pictorial stimuli also need to be modified to ensure that the features of the characters and objects (e.g., hair color, clothing, and types of food) are in line with the corresponding cultural group ([Qi & Roberts, 2017](#)).

## 4.2 Language

Another challenge in cross-cultural research is whether the test instructions for a specific cultural group follow its idiomatic patterns. For example, in an unpublished study ([Qi & Roberts, 2017](#)), we examined how Chinese and Euro-Canadian children's self-constructs are associated with their memory encoding and delayed retrieval. We used the revised Twenty Statements Test (TST) to assess children's conceptualization of the self. The test required them to do a self-introduction by filling in a series of "I....." prompts (e.g., I am a girl and I love music). The original TST contains "I am....." stems ([Kuhn & McPartland, 1954](#)). We changed "I am" to "I" because "I am" would limit Chinese children's expressions of internal attributes. Specifically, in spoken Mandarin (our Chinese sample's first language), "I am" is "Wo Shi" (我是), which is usually followed by a noun (e.g., personal roles: a mom, a student) as opposed to an adjective (e.g., personal characteristics: nice and smart). This notion was confirmed in our pilot ([Qi & Roberts, 2016](#)), in which we examined whether the style of 8- to 9-year-old Chinese children's self-statements would be contingent on whether they were prompted with "I am" or "I" stems. We found children who received the "I am" prompt provided proportionally more descriptions regarding their social identities (e.g., I am a son, I am a Grade 4 student, I am from China, and I am from X school) compared to those who responded to the "I" stems. Therefore, results based on "I am" prompts could potentially lead to biased results of Chinese children's self-views, thereby confounding researchers' interpretations of the association between children's self-constructs

and memory (Li, 2006; Setoh, Qin, Zhang, & Pomerantz, 2015). Overall, we suggest that researchers need to be cognizant of the challenges inherent in designing and developing developmentally and culturally adaptive experimental stimuli, test materials, and interview questions. Given the importance of cultural awareness and sensitivity in designing and conducting cross-cultural research, it is also necessary for researchers to collaborate with native speakers in their research.

Most cross-cultural research on children's memory has made comparisons between Eastern and Western countries (e.g., Han et al., 1998; Wang, 2004) and therefore inevitably involves dealing with languages with disparate characteristics. For example, Chinese and English are distinctively different in structure (logographic vs alphabetic) and manners of expressions. Specifically, Mandarin Chinese is relatively "tense-less" compared to English (Chen, Su, & O'Seaghdha, 2013; Lin, 2003). English has a complex tense system that can help the speaker to recount experienced events situated in particular times, such as the present continuous tense, the present perfect continuous tense, and the past perfect continuous tense. In contrast, Mandarin does not consist of such an exhaustive repository of tense expressions. In a straightforward way, Mandarin speakers usually add temporal markers in a statement (e.g., *yesterday*, *last month*, and *tomorrow*) to illustrate events that occurred in the past and future. Furthermore, individuals could also insert "le" ("了") in a sentence to represent the past tense. For instance, "I went to my grandmother's house" could be expressed in Mandarin as "Wo qu le nai jia" ("我去了奶奶家"), in which the word "went" and "le" serve as the same function to indicate the past. However, "le" and other conventional temporal makers (e.g., *yesterday*) in spoken Mandarin are sometimes omitted in daily conversations. Findings from Chen et al.'s (2013) study revealed that Chinese participants' narratives, in general, tend to show a low level of temporal specificity when they were not directly asked to attend to the temporal information of the target events, which corroborate Han et al. (1998) finding that Chinese children's memory narratives contained fewer temporal markers compared to American children. The implicit and indirect temporal expression in spoken Mandarin could render it difficult to discern whether the recounted experiences occurred in the past or represent a generic pattern of a specific activity, especially in studies that aim to compare cultural differences in retrieval of episodic and generic information (Roberts, Qi, et al., 2016).

In one of our lab projects that assessed Taiwanese (whose first language is Mandarin) and Canadian children's memory of a repeated event, we found it

difficult to code Taiwanese children's reports because they show a greater tendency to respond to the interviewer's *episodic* prompt (e.g., "what did you do during x activity?," "你们在 x 活动的时候做了什么?") with statements containing present tense (e.g., "I play a puzzle," "我玩儿拼图啊"). It appears that Taiwanese children omitted the temporal markers in their responses and assumed that the interviewer knew that they were talking about the instance in question. This poses a dilemma when comparing cultures—to code such a present-tense statement as *generic* (as would occur if the same sentence was spoken by an English speaker) would underestimate Taiwanese children's episodic recall.

Coders would need to speculate whether Mandarin speakers' present-tense statements refer to a specific instance or a general pattern; such a subjective conjecture is subject to coder bias which could weaken the reliability of the coding procedure. Therefore, the onus is on the interviewer to elicit unequivocal statements from the participants. That is, the interviewer could ask follow-up questions based on children's present-tense statements (e.g., "You mentioned x, when did it happen?"). However, the interviewer must also avoid asking suggestive questions (e.g., "did it happen during xx activity?") that may mislead children's responses and confound their memory (Roberts, 2002). Providing follow-up prompts would undoubtedly sacrifice the consistency of the interview protocol across different cultural groups, because Chinese children may require more prompts than English-speaking children. Researchers could use the number of prompts as a covariate in their analyses to control for its effects.

These caveats for cross-cultural research presuppose that Chinese children recall episodic details, but they fail to retrieve such information given the absence of follow-up questions probing into their present-tense statements. Of course, another hypothesis is that Chinese children indeed cannot recall episodic details. According to Nelson and Fivush (2004), language plays an essential role in shaping how the perceived information is represented in children's brains. Given that Mandarin-speaking children are not often prompted by their linguistic environment to attend to temporal information, they may tend to encode, remember, and retrieve their experienced events in a generic fashion such that the encoded information is constructed without being attached to a specific temporal marker. If this is the case, then asking follow-up clarification questions may not facilitate children to pinpoint when exactly the recalled detail took place. Findings from previous research tend to concur with this possibility as the style of Chinese children's memory reports is shown to be *generic* compared to their Western



counterparts (e.g., Han et al., 1998; Peterson et al., 2009; Wang, 2004, 2006). Nevertheless, more research is warranted to illuminate whether Chinese children's *generic* memory reporting is due to the lack of specific follow-up prompts, an inability to remember episodic events, or specific linguistic markers.

In conclusion, only the tip of the iceberg regarding cultural influences on memory has been revealed thus far, and there are a variety of intricate questions that still await further investigation. For example, would children's self-view and cultural beliefs operate on the initial stage of remembering? How would cultural influences on children's memory change over the course of development? Do children from different cultural groups show a similar developmental trajectory in their remembering processes? In the next section, we turn to discuss how the shifts in cultural values in contemporary society must be considered in cross-cultural research.



## **5. The dynamic nature of culture in the 21st century: Changing societies**

### **5.1 Shifts toward individualism**

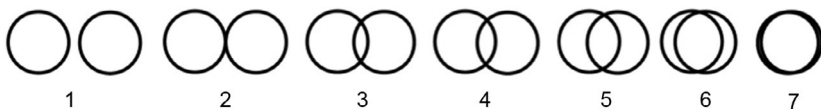
Culture should not be regarded as a static entity; instead, it goes through constant and dynamic changes (Greenfield, 2009; Markus & Kitayama, 2010). More recently, as a consequence of changes in various sociodemographic factors (e.g., economic boosts and the advancement of technology), studies have documented a rise of individualism in East Asian countries, such as China and Japan (e.g., Allen et al., 2007; Cai, Kwan, & Sedikides, 2012; Greenfield, 2013; Hamamura & Xu, 2015). Researchers, however, found that traditional collectivist countries still value some elements of collectivist beliefs (Hamamura, 2012; Santos, Varnum, & Grossmann, 2017). Overall, one cannot deny that there have been drastic changes in East Asian societies over the last few decades (Chen & Chen, 2010). According to Vygotsky, the development of children's mental functioning relies on sociocultural environments (John-Steiner & Mahn, 1996). Therefore, societal changes could substantially transform social practices and cultural meanings, and lead to tangible intracultural differences in various domains of life across different cohorts.

Social changes could have significant implications for children's development. Elder (1974) research, for example, revealed that the Great Depression in the United States during the 1930s profoundly impacted parenting styles, family structure, and children's behaviors. In the recent past, the rapid

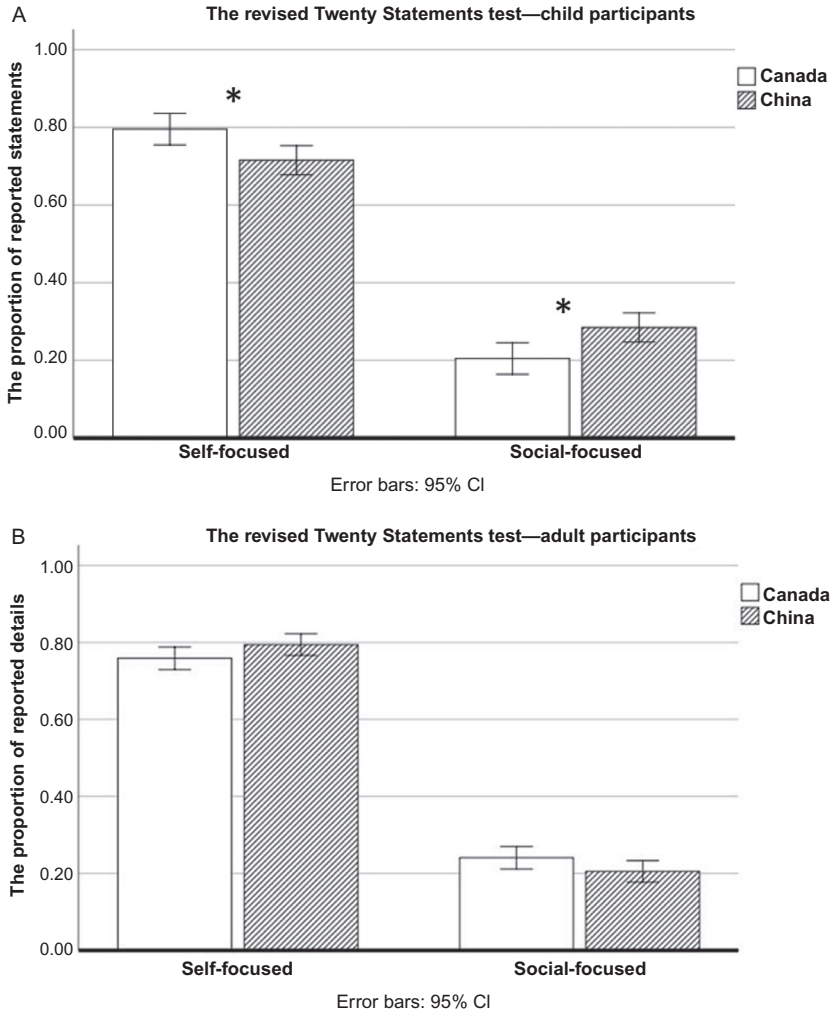
progress of urbanization, increased opportunity for advanced school education, and growing commercialization have led Asian societies (e.g., China, Japan, and Turkey) to adopt many aspects of individualist values that prevail in Western countries (Bassani, 2003; Hamamura & Xu, 2015; Kagitcibasi & Ataca, 2005).

Thus, new research questions will arise about how children learn, acquire, and internalize cultural beliefs, while the society undergoes changes. That is, little is known about how cultural changes shape the developmental trends of individuals' assimilation of cultural ideologies. We examined the developmental trajectory of Chinese and Canadian children and emerging adults' cultural self-construal (Qi et al., 2018). Specifically, 7- to 10-year-old children and 16- to 20-year-old university students completed two measures (i.e., the revised TST and the Inclusion of Others in the Self Scale: IOS) to examine the extent to which they endorse an independent vs an interdependent self-construal. The IOS scale (Li, 2002) requires participants to indicate their perceived interdependence with each of their family members (i.e., mom, dad, and siblings) by choosing a group of circles that could best represent their closeness (see Fig. 5). As shown in Fig. 6A, Chinese children described themselves with more social-oriented statements (e.g., I am a daughter and I love my sister) and less self-oriented statements (e.g., I like reading and I am nice) compared to their Canadian counterparts. However, the theme of adult participants' self-descriptions did not differ across cultural groups (see Fig. 6B). Parallel to the I-statement findings, Chinese children perceived themselves as closer to their family compared to Canadian children (see Fig. 7). Adults' perceived closeness with family members did not vary with culture. These findings indicate that individuals show age differences in internalizing cultural values, and the age trend may differ as a function of cultural groups.

Our conjecture is that the cultural differences we observed in the developmental trend of self-construal may be due to children and adults' different socialization environments. Specifically, compared to adults, children generally rely more on what they have acquired through socialization practices with parents and teachers to guide their thoughts and behaviors.

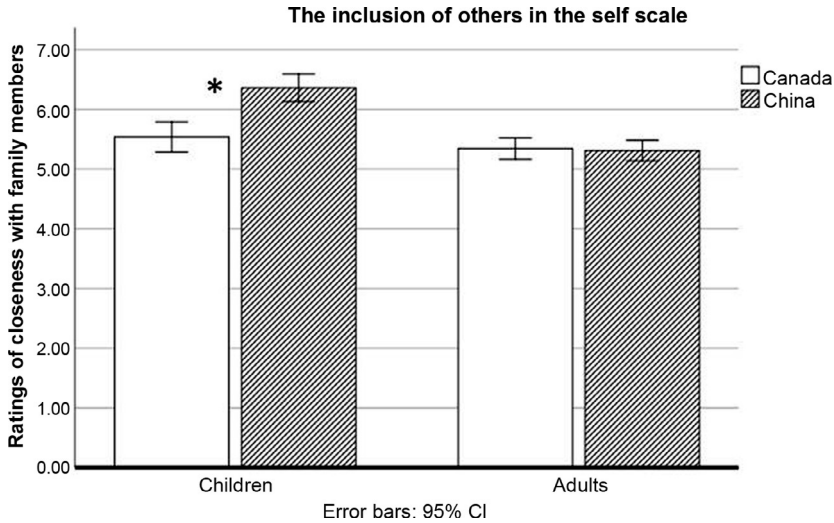


**Fig. 5** The pictorial representation of participants' perceived closeness with their family members. The closer the two circles, the closer the relationship.



**Fig. 6** Differences in the theme of self-descriptions between children (A) and adults (B) across two cultural groups. Error bars: 95% CI. \* $P < 0.05$ .

Emerging adults, however, are relatively more autonomous individuals who are exposed to advanced technology, mass media, and the materialized society that impart them with individualistic ideologies. Consequently, the cultural differences in Chinese and Canadian adults would be less pronounced compared to children. [Rosenqvist et al. \(2017\)](#) research also showed that country variations (i.e., Finland, Italy, and the United States) in 3- to 15-year-old children's performance on a range of neurocognitive tasks



**Fig. 7** Differences in participants' perceived closeness with family members by culture and age. Error bars: 95% CI. \* $P < 0.05$ .

(e.g., executive function, face memory, and phonological processing) were more salient among the younger as opposed to the older participants. Rosenqvist and colleagues posited that country differences in cognitive tasks tend to be attenuated in adolescence. Overall, most of the prior literature investigated cultural influences on memory by recruiting children within a small age range and concentrated on comparing Chinese vs North American children (see Table 2). There are also studies that used more diverse samples (e.g., Turkish, New Zealanders, and Iranian children), but examinations of cultural influences on the developmental trends of children's memory are rare (see Table 1). Future research could include a broad age span and sample to investigate the developmental process of cultural acquisition, and how children's memory may differ due to cultural variations in this process.

## 5.2 Attitudes regarding parenting styles

Through what processes do cultural shifts translate into changes in children's development? According to Bronfenbrenner (1977) ecological system, children's family and school systems are the important socialization environments that shape their value systems. Given the radical changes in Asian societies, the parental norms, goals, and behaviors have also shifted accordingly. Kagitcibasi and Ataca (2005), for example, examined the effects of

**Table 2** Examples of cross-cultural literature on Chinese and North American Children's memory

Study	Cultural group	Age (in years)	Measured variables
Domino and Hannah (1987)	Chinese (from Beijing) vs American (from Los Angeles) children	11–13	Stories narrated by participants based on the given story plots
Han et al. (1998)	Chinese (from Beijing), Euro-American (from Boston), and Korean (from Seoul) children	4 and 6	Autobiographical memory Story memory
Wang and Leichtman (2000)	Chinese (from Beijing) vs American (from Boston) children	6	Stories narrated by participants based on the given story plots and pictorial stimuli
Wang, Leichtman, and Davies (2000)	Chinese (from Beijing) vs Euro-American (from Boston) mother–child dyads	3	Mother–child conversations
Wang (2004)	Chinese (from Beijing) vs American (from Ithaca) children	3–8	Autobiographical memory Self-concept
Wang and Fivush (2005)	Chinese (from Beijing) vs Euro-American (from Ithaca) mother–child dyads	3	Mother–child conversations
Wang (2006)	Chinese (from Beijing), Chinese immigrant, and Euro-American (from New York) mother–child dyads	3	Autobiographical memory Maternal reminiscing style Children's self-concept
Wang et al. (2006)	Chinese (from Beijing) vs American (from New York) children	3	Autobiographical memory Emotion knowledge
Wang (2007)	Chinese (from Beijing), Chinese immigrant, and Euro-American (from New York) mother–child dyads	3, 3.5, and 4.5	Mother's self-construal Mother–child conversations
Peterson et al. (2009)	Chinese (from Beijing and Zhejiang) vs Euro-Canadian (from Newfoundland) children	8, 11, and 14	Autobiographical memory
Wang et al. (2010)	Chinese (from Beijing and Zhejiang) vs Euro-Canadian (from Newfoundland) children	8, 11, and 14	Autobiographical memory
Klemfuss and Wang (2017)	Chinese immigrant vs Euro-American children from the United States	6	Event memory

social changes on Turkish parents' expectations and beliefs in their child-rearing practices. They found a shift favoring the direction of individualism in parenting styles as Turkish parents, especially those from a high SES background, come to place great emphasis on fostering children's independence over the last three decades. Similarly, [Chen and Chen \(2010\)](#) found that compared to Chinese parents in the 1998 cohort, those in their 2002 cohort perceived themselves as showing more parental warmth and less power assertion compared to their counterparts. Moreover, Chinese mothers in the 2002 cohort reported exhibiting a greater tendency to facilitate children's autonomy relative to those in the 1998 cohort. Both cohorts placed a similar level of emphasis on children's academic achievement. Compared to traditional Chinese school style of an overbearing focus on academic excellence, researchers found that an increasing number of Chinese schools have focused more on cultivating children's abilities of free expression and autonomy by facilitating engagement in extracurricular activities ([Yu, 2002](#)). Thus, conceivably, children's immediate socialization environment (e.g., parental, peer, and educational practices) is informed by the constantly changing cultural context, which, in turn, contours their social and cognitive development ([John-Steiner & Mahn, 1996](#)).

### 5.3 One-child policy

Given that parent-child interactions could serve as a mediator through which culture exerts its influences on children's memory, one may wonder whether the cultural variations in memory revealed in the existing literature are still valid. [Wang \(2006\)](#) found that parents from Mainland China (from only-child families) tend to incorporate more elaborations and child-centered responses (e.g., confirm and emphasize children's utterances) compared to Chinese immigrant mothers in the United States. Children from Mainland China also provided more narratives when interacting with their mothers compared to their immigrant counterparts. Concurring with other scholars (e.g., [Jiao, Ji, & Jing, 1986](#)), [Wang \(2006\)](#) suggested that the one-child policy in China had led family members to pay excessive attention to their only child to fulfill their desires. As a result, children from such a family tend to be more self-focused and develop a stronger sense of autonomous agency compared to immigrant children whose family is more likely to adhere to traditional collectivist values. However, regardless of immigration background, there are still significant and qualitative differences in maternal reminiscing style and memory recall between European American

and Chinese participants, as outlined earlier. Therefore, it appears that Chinese culture is indeed undergoing transformations, but whether such transformations would ultimately lead Chinese and European children to have a similar style of narrative and memory processes awaits future research. In 2016, the Chinese government abolished the one-child policy, and families are therefore allowed to have two children. However, given the increase in the aging population and a decrease in the birth rate in China, the government has announced plans to lift the policy restricting the family sizes in 2020. These policy changes would reshape the structure of Chinese families and would also suggest additional factors for researchers investigating the influences of family dynamics on children's cognitive development.

#### 5.4 Urban vs rural contexts

As illustrated in [Table 1](#), some cross-cultural studies have made urban–rural distinctions when examining children's cognitive processes. Scholars have found that rural vs urban upbringing leads to qualitative differences in children's memory (e.g., [Göz et al., 2017](#); [Niraula & Mishra, 2001](#)). For example, [Göz et al. \(2017\)](#) found that the earliest memory of Turkish children who live in a rural environment was dated a year later compared to their counterparts who were brought up in the city. [Greenfield \(2009\)](#) proposed that small-scale communities emphasize more collectivist values (e.g., interdependence between family members and long-term commitment in social relations) compared to large-scale societies. Conceivably, then, there could be within-country differences in children's cognition due to the environment they were raised in, a topic that is understudied. In a collectivist society (e.g., China and Japan), compared to rural children, urban children's memory patterns may tend to resemble Western-style remembering more than children living in rural areas in China. Therefore, future cross-cultural research could make its cultural comparison more nuanced by investigating the role that the upbringing context plays. For example, researchers could group their samples based on within-country differences (e.g., urban vs rural communities) to investigate how the interplay of cultural background and upbringing context affects children's cognition. [Chen, Wang, and Wang \(2009\)](#) found that the same psychological trait (i.e., shyness) has different implications for rural migrant and urban Chinese children. Specifically, for rural immigrant children, shyness was positively related to their school and social adjustment. However, for urban Chinese children, the trend was more consistent with findings obtained from Western children such that

shyness was negatively related to their school and social adjustment, as well as psychological well-being. Therefore, within-group variations in children's cognition are also worthy of investigation.



## 6. Applied implications

### 6.1 Forensic arena

Previously, we (Roberts, Evans, et al., 2016; Roberts, Qi, et al., 2016) outlined practical concerns regarding cultural differences in children's memory retrieval. Specifically, we highlighted how culture and memory research can be applied to important questions in the forensic arena. Aside from significant influences on the probability that a child from a given culture discloses child sexual abuse, the cultural characteristics of memory narratives can have a profound effect on justice for immigrants of non-European heritage.

In forensic investigative interviews of alleged child sexual abuse in many Western societies (e.g., Canada, the United States, and Australia), children are often expected to provide a precise and detailed testimony of separate instances of the alleged crime to support specific charges against the alleged perpetrator (Roberts, 2002). As described earlier, prior work has found that children's ability to retrieve a specific episode or an instance of a repeated event is a difficult task for Western children (e.g., Brubacher, Glisic, et al., 2011; Brubacher, Roberts, et al., 2011; Schneider, Price, Roberts, & Hedrick, 2011). Such difficulties may only be amplified in cultures where language and memory are more generic in nature. This issue has been exclusively examined in English-speaking countries (e.g., America, Canada, and Australia), but little is known about whether Asian children's memory of repeated events would show a similar trend. How, for example, would Asian children respond to prompts like *Tell me about the time you remember best*, a prompt that is very effective with Western children (Danby et al., 2017), but may not be the best way to elicit Asian children's testimony. The issue is highlighted in Brubacher, Glisic, et al.'s (2011) and Brubacher, Roberts, et al.'s (2011) study where children's narratives of a repeated event were analyzed regarding episodic vs generic information. In their coding scheme, tense-less statements (e.g., "I get a badge") were considered as *generic*, whereas utterances that were expressed in past-tense (e.g., "I got a badge") were coded as *episodic*. Other researchers also used a similar coding system (e.g., Schneider et al., 2011). Given that children's expressions in Mandarin are often tense-less, coding *episodic* vs *generic*



information based on tense may lead researchers to misconstrue that Chinese children lack the ability to recount episodic events.

This issue is not trivial. Connolly and colleagues have consistently found that mock jurors consider generic reports to be less credible than detailed, episodic reports (Weinsheimer, Coburn, Chong, MacLean, & Connolly, 2017). Thus, Asian children may be mistakenly perceived as retelling fictitious events. As many prosecutors in the United States and Canada are reticent to pursue trials involving child complainants of sexual abuse, the already low probabilities of conviction may plummet to even lower levels for children whose culture emphasizes *generic vs specific*, self-focused reports. We also do not know whether culture affects children's susceptibility when given false information (fake news, even) as a function of who provides the misinformation. In one study, an adult source who presented false information about an event was more detrimental to child witness accuracy than a peer, but this detrimental effect diminished as witness age increased (Carol & Compo, 2017). Additional research is needed to address such questions as, "Would adults who practice a more disciplined style of parenting have children who reveal the same pattern on the uptake of false information compared to children of adults with less restrictive parenting styles?"

## 6.2 Immigrants and asylum-seekers

East Asian immigrants make up a large and increasing percentage of the population in North America (Roberts, Evans, et al., 2016; Roberts, Qi, et al., 2016). In the acculturation process, children from immigrant families may face a variety of challenges due to the inconsistency between the values of their home culture and the values of their host culture. For example, as East Asian children are influenced by collectivist values that encourage the suppression of individual opinions, they may find it difficult to spontaneously express their thoughts, desires, and feelings. As a result, immigrant children's needs may be overlooked by the plethora of professionals they will encounter in their new lives, such as doctors, educators, and social workers, inevitably resulting in a poorer standard of living. Therefore, more applied research is needed to examine the extent to which East Asian immigrant children may be disadvantaged in a western society.

According to the statistics provided by the United Nations High Commissioner for Refugees (UNHCR, 2018), 3.1 million asylum-seekers were forcibly displaced and sought international protection in 2018. Given the lack of supporting documentation of the asylum-seekers' circumstances,

immigration judges often need to assess the credibility of asylum claimants' statements to decide whether applicants qualify for asylum status. That is, whether asylum-seekers can provide a detailed and coherent testimony to convince the judges could determine whether they will be granted the protection sought by receiving asylum (Weinsheimer et al., 2017). Many asylum-seekers are from collectivist communities (e.g., Syria and Afghanistan). According to the finding of cross-cultural research on East Asians and Europeans, we could speculate that asylum-seekers may recall their experienced events in a similar way as East Asians do such that their memories may tend to be more *generic* and less *specific*. This could lead to their testimony being discredited by judges. Therefore, an important avenue for future research is to explore whether the features of asylum-seekers' memory recollection would render them disadvantaged in the asylum application process.

Presently, the most prominent research on cross-cultural memory processes comes from comparisons between adults and children from South East Asia and the United States. However, in a global society it is important to be more inclusive and address unique cultural features of other countries. Given the predominance of studies with Chinese and Americans, we conducted a literature search on recent cultural psychology studies describing populations outside the United States and present our findings in Table 1. Our search criteria were broad in that we included studies that *generally* focused on memory and cognition (including executive functioning processes). We hope that this table can be used to highlight that there is a wealth of information gathered around the world pertaining to cultural processes in development (see Table 1).



---

## 7. Conclusion

Findings from the recent literature and our research indicate that children from different cultural backgrounds encode, reconstruct, and recall experienced events in different manners (e.g., the level of specificity and the content). Child-rearing beliefs and parent-child interactions (e.g., maternal reminiscing style) play a significant role in shaping these cultural variations. However, associations between culture and specific memory processes still need to be elucidated using methods other than those used previously. Moreover, researchers must be more sensitive to the challenges in designing developmentally, culturally, and linguistically suitable events and

interview protocols. The dramatic social transformations in collectivist societies, increases in families relocating to different cultural contexts, and the presence of multiple cultural contexts in people's lives offer a unique opportunity to better understand the complex relations among memory, the self, and culture. As an academic community with a clearly identified agenda of unanswered research questions, we are poised to make considerable strides toward a thorough and nuanced understanding of cultural influences on children's cognitive development.

## References

- Alansari, B. M., & Soliman, A. M. (2012). Measurement invariance of working memory measures across two Arab cultures. *Perceptual and Motor Skills, 115*(1), 43–59. <https://doi.org/10.2466/22.03.08.PMS.115.4.43-59>.
- Allen, M. W., Ng, S. H., Ikeda, K., Jawan, J. A., Sufi, A. H., Wilson, M., et al. (2007). Two decades of change in cultural values and economic development in eight East Asian and Pacific island nations. *Journal of Cross-Cultural Psychology, 38*(3), 247–269. <https://doi.org/10.1177/0022022107300273>.
- Alloway, T. P., Moulder, R., Horton, J. C., Leedy, A., Archibald, L. M. D., Burin, D., et al. (2017). Is it a small world after all? Investigating the theoretical structure of working memory cross-nationally. *Journal of Cognition and Culture, 17*(3–4), 331–353.
- Artioli, F., Reese, E., & Hayne, H. (2015). Benchmarking the past: Children's early memories and maternal reminiscing as a function of family structure. *Journal of Applied Research in Memory and Cognition, 4*(2), 136–143. <https://doi.org/10.1016/j.jarmac.2015.04.002>.
- Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes 1. In K. W. Spence & J. T. Spence (Eds.), *Psychology of learning and motivation: Vol. 2*. (pp. 89–195). Academic Press. [https://doi.org/10.1016/S0079-7421\(08\)60422-3](https://doi.org/10.1016/S0079-7421(08)60422-3).
- Aviezer, O., Sher-Censor, E., & Stein-Lahad, T. (2017). Earliest memories in Israeli kibbutz upbringing: It is parental engagement that makes a difference. *Memory, 25*(10), 1375–1389. <https://doi.org/10.1080/09658211.2017.1307991>.
- Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. New York, NY: Cambridge University Press.
- Bassani, C. (2003). A look at changing parental ideologies & behaviors in Japan. *Sociological Research Online, 8*(1), 1–14.
- Bauer, P. J., Burch, M. M., Scholin, S. E., & Güler, O. E. (2007). Using cue words to investigate the distribution of autobiographical memories in childhood. *Psychological Science, 18*(10), 910–916. <https://doi.org/10.1111/j.1467-9280.2007.01999.x>.
- Bender, M., & Chasiotis, A. (2011). Number of siblings in childhood explains cultural variance in autobiographical memory in Cameroon, People's Republic of China, and Germany. *Journal of Cross-Cultural Psychology, 42*(6), 998–1017. <https://doi.org/10.1177/0022022110381127>.
- Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist, 32*(7), 513–531. <https://doi.org/10.1037/0003-066X.32.7.513>.
- Brubacher, S. P., Earhart, B., Roberts, K. P., & Powell, M. B. (2018). Effects of label training and recall order on children's reports of a repeated event. *Applied Cognitive Psychology, 32*, 600–609. <https://doi.org/10.1002/acp.3440>.
- Brubacher, S. P., Glisic, U., Roberts, K. P., & Powell, M. (2011). Children's ability to recall unique aspects of one occurrence of a repeated event. *Applied Cognitive Psychology, 25*(3), 351–358. <https://doi.org/10.1002/acp.1696>.

- Brubacher, S. P., Roberts, K. P., & Powell, M. (2011). Effects of practicing episodic versus scripted recall on children's subsequent narratives of a repeated event. *Psychology, Public Policy, and Law*, 17(2), 286–314. <https://doi.org/10.1037/a0022793>.
- Brubacher, S. P., Roberts, K. P., & Powell, M. (2012). Retrieval of episodic versus generic information: Does the order of recall affect the amount and accuracy of details reported by children about repeated events? *Developmental Psychology*, 48(1), 111–122. <https://doi.org/10.1037/a0025864>.
- Cai, H., Kwan, V. S. Y., & Sedikides, C. (2012). A sociocultural approach to narcissism: The case of modern China. *European Journal of Personality*, 26(5), 529–535. <https://doi.org/10.1002/per.852>.
- Carol, R. N., & Compo, N. S. (2017). Other people: A child's age predicts a source's effect on memory. *Legal and Criminological Psychology*, 22(1), 74–87. <https://doi.org/10.1111/lcrp.12078>.
- Catale, C., Meulemans, T., & Thorell, L. B. (2015). The childhood executive function inventory: Confirmatory factor analyses and cross-cultural clinical validity in a sample of 8- to 11-year-old children. *Journal of Attention Disorders*, 19(6), 489–495. <https://doi.org/10.1177/1087054712470971>.
- Chao, R. K. (1994). Beyond parental control and authoritarian parenting style: Understanding Chinese parenting through the cultural notion of training. *Child Development*, 65(4), 1111–1119. <https://doi.org/10.2307/1131308>.
- Chen, X., & Chen, H. C. (2010). *Children's socioemotional functioning and adjustment in the changing Chinese society. Social change and human development: Concept and results*. London, UK: Sage, pp. 209–226. <https://doi.org/10.4135/9781446252161.n10>.
- Chen, Y., McAnally, H. M., & Reese, E. (2013). Development in the organization of episodic memories in middle childhood and adolescence. *Frontiers in Behavioral Neuroscience*, 7(9), 84. <https://doi.org/10.3389/fnbeh.2013.00084>.
- Chen, J., Su, J., & O'Seaghda, P. G. (2013). Enduring moments: The extended present in Chinese speakers' orientation to event time. *Journal of Pragmatics*, 45(1), 90–103. <https://doi.org/10.1016/j.pragma.2012.10.009>.
- Chen, X., Wang, L., & Wang, Z. (2009). Shyness-sensitivity and social, school, and psychological adjustment in rural migrant and urban children in China. *Child Development*, 80(5), 1499–1513. <https://doi.org/10.1111/j.1467-8624.2009.01347.x>.
- Chrysochoou, E., Bablekou, Z., Masoura, E., & Tsigilis, N. (2013). Working memory and vocabulary development in Greek preschool and primary school children. *European Journal of Developmental Psychology*, 10(4), 417–432. <https://doi.org/10.1080/17405629.2012.686656>.
- Chua, H. F., Boland, J. E., & Nisbett, R. E. (2005). Cultural variation in eye movements during scene perception. *Proceedings of the National Academy of Sciences of the United States of America*, 102(35), 12629–12633. <https://doi.org/10.1073/pnas.0506162102>.
- Conant, L. L., Fastenau, P. S., Giordani, B., Boivin, M. J., Chounramany, C., Xaisida, S., et al. (2003). Environmental influences on primary memory development: A cross-cultural study of memory span in Lao and American children. *Journal of Clinical and Experimental Neuropsychology*, 25(8), 1102–1116. <https://doi.org/10.1076/jcen.25.8.1102.16722>.
- Connolly, D. A., & Lindsay, D. S. (2001). The influence of suggestions on children's reports of a unique experience versus an instance of a repeated experience. *Applied Cognitive Psychology*, 15(2), 205–223. [https://doi.org/10.1002/1099-0720\(200103/04\)15:2<205::AID-ACP698>3.0.CO;2-F](https://doi.org/10.1002/1099-0720(200103/04)15:2<205::AID-ACP698>3.0.CO;2-F).
- Conway, M. A. (2005). Memory and the self. *Journal of Memory and Language*, 53(4), 594–628. <https://doi.org/10.1016/j.jml.2005.08.005>.
- Cooley, C. (1956). *Two major works: Social organization. Human nature and the social order*. Glencoe, IL: Free Press.

- Danby, M. C., Brubacher, S. P., Sharman, S. J., Powell, M. B., & Roberts, K. P. (2017). Children's reasoning about which episode of a repeated event is best remembered. *Applied Cognitive Psychology, 31*(1), 99–108. <https://doi.org/10.1002/acp.3306>.
- DiYanni, C. J., Corriveau, K. H., Kurkul, K., Nasrini, J., & Nini, D. (2015). The role of consensus and culture in children's imitation of inefficient actions. *Journal of Experimental Child Psychology, 137*, 99–110. <https://doi.org/10.1016/j.jecp.2015.04.004>.
- Domino, G., & Hannah, M. T. (1987). A comparative analysis of social values of Chinese and American children. *Journal of Cross-Cultural Psychology, 18*(1), 58–77. <https://doi.org/10.1177/0022002187018001007>.
- El Asam, A., & Samara, M. (2015). The cognitive interview: Improving recall and reducing misinformation among Arab children. *Journal of Forensic Psychology Practice, 15*(5), 449–477. <https://doi.org/10.1080/15228932.2015.1099350>.
- Elder, G. H., Jr. (1974). *Children of the great depression*. Chicago: University of Chicago Press.
- Farrar, M. J., & Goodman, G. S. (1992). Developmental changes in event memory. *Child Development, 63*(1), 173–187.
- Fitzgerald, J. M. (2010). Culture, gender, and the first memories of black and white American students. *Memory & Cognition, 38*(6), 785–796. <https://doi.org/10.3758/MC.38.6.785>.
- Friedman, W. J. (1986). The development of children's knowledge of temporal structure. *Child Development, 57*(6), 1386–1400. <https://doi.org/10.2307/1130418>.
- Friedman, W. J. (1992). The development of children's representations of temporal structure. In F. Macar, V. Pouthas, & W. J. Friedman (Eds.), *Time, action and cognition: Towards bridging the gap; time, action and cognition: Towards bridging the gap* (pp. 67–75). New York, NY: Kluwer Academic/Plenum Publishers. (Chapter xviii, 407 pages). [https://doi.org/10.1007/978-94-017-3536-0\\_7](https://doi.org/10.1007/978-94-017-3536-0_7).
- Galindo, J. H., & Harris, P. L. (2017). Mother knows best? How children weigh their first-hand memories against their mothers' reports. *Cognitive Development, 44*, 69–84. <https://doi.org/10.1016/j.cogdev.2017.08.008>.
- Giofrè, D., Mammarella, I. C., & Cornoldi, C. (2014). The relationship among geometry, working memory, and intelligence in children. *Journal of Experimental Child Psychology, 123*, 112–128. <https://doi.org/10.1016/j.jecp.2014.01.002>.
- Gosse, L. L., & Roberts, K. P. (2014). Children's use of a 'time line' to indicate when events occurred. *Journal of Police and Criminal Psychology, 29*(1), 36–43. <https://doi.org/10.1007/s11896-013-9118-x>.
- Göz, İ., Çeven, Z. İ., & Tekcan, A. İ. (2017). Urban–rural differences in children's earliest memories. *Memory, 25*(2), 214–219. <https://doi.org/10.1080/09658211.2016.1150490>.
- Greenfield, P. M. (2009). Linking social change and developmental change: Shifting pathways of human development. *Developmental Psychology, 45*(2), 401–418. <https://doi.org/10.1037/a0014726>.
- Greenfield, P. M. (2013). The changing psychology of culture from 1800 through 2000. *Psychological Science, 24*(9), 1722–1731. <https://doi.org/10.1177/0956797613479387>.
- Greenfield, P. M., Keller, H., Fuligni, A., & Maynard, A. (2003). Cultural pathways through universal development. *Annual Review of Psychology, 54*, 461–490. <https://doi.org/10.1146/annurev.psych.54.101601.145221>.
- Hamamura, T. (2012). Are cultures becoming individualistic? A cross-temporal comparison of individualism–collectivism in the United States and Japan. *Personality and Social Psychology Review, 16*(1), 3–24. <https://doi.org/10.1177/1088868311411587>.
- Hamamura, T., & Xu, Y. (2015). Changes in Chinese culture as examined through changes in personal pronoun usage. *Journal of Cross-Cultural Psychology, 46*(7), 930–941. <https://doi.org/10.1177/0022022115592968>.
- Han, J. J., Leichtman, M. D., & Wang, Q. (1998). Autobiographical memory in Korean, Chinese, and American children. *Developmental Psychology, 34*(4), 701–713. <https://doi.org/10.1037/0012-1649.34.4.701>.

- Harpaz-Rotem, I., & Hirst, W. (2005). The earliest memory in individuals raised in either traditional and reformed kibbutz or outside the kibbutz. *Memory*, 13(1), 51–62. <https://doi.org/10.1080/09658210344000567>.
- Haun, D. B. M., Rapold, C. J., Janzen, G., & Levinson, S. C. (2011). Plasticity of human spatial cognition: Spatial language and cognition covary across cultures. *Cognition*, 119(1), 70–80. <https://doi.org/10.1016/j.cognition.2010.12.009>.
- Hofstede, G. (1984). Cultural dimensions in management and planning. *Asia Pacific Journal of Management*, 1(2), 81–99.
- Imada, T., Carlson, S. M., & Itakura, S. (2013). East–West cultural differences in context-sensitivity are evident in early childhood. *Developmental Science*, 16(2), 198–208. <https://doi.org/10.1111/desc.12016>.
- Jiao, S., Ji, G., & Jing, Q. (1986). Comparative study of behavioral qualities of only children and sibling children. *Child Development*, 57(2), 357–361. <https://doi.org/10.2307/1130591>.
- Jobson, L., Burford, K., Burns, B., Baldry, A., & Wu, Y. (2018). Investigating whether maternal memory specificity is indirectly associated with child memory specificity through maternal reminiscing. *Memory*, 26, 1335–1343. <https://doi.org/10.1080/09658211.2018.1474929>.
- John-Steiner, V., & Mahn, H. (1996). Sociocultural approaches to learning and development: A Vygotskian framework. *Educational Psychologist*, 31(3–4), 191–206. [https://doi.org/10.1207/s15326985ep3103&4\\_4](https://doi.org/10.1207/s15326985ep3103&4_4).
- Kagitcibasi, C., & Ataca, B. (2005). Value of children and family change: A three-decade portrait from Turkey. *Applied Psychology: An International Review*, 54(3), 317–337. <https://doi.org/10.1111/j.1464-0597.2005.00213.x>.
- Klemfuss, J. Z., & Wang, Q. (2017). Narrative skills, gender, culture, and children’s long-term memory accuracy of a staged event. *Journal of Cognition and Development*, 18(5), 577–594. <https://doi.org/10.1080/15248372.2017.1392308>.
- Kuhn, M. H., & McPartland, T. S. (1954). An empirical investigation of self-attitudes. *American Sociological Review*, 19(1), 68–76.
- Kuwabara, M., & Smith, L. B. (2012). Cross-cultural differences in cognitive development: Attention to relations and objects. *Journal of Experimental Child Psychology*, 113(1), 20–35. <https://doi.org/10.1016/j.jecp.2012.04.009>.
- Lambert, F. R., Lavenex, P., & Lavenex, P. B. (2017). The “when” and the “where” of single-trial allocentric spatial memory performance in young children: Insights into the development of episodic memory. *Developmental Psychobiology*, 59(2), 185–196. <https://doi.org/10.1002/dev.21479>.
- Leichtman, M. D., Pillemer, D. B., Wang, Q., Koreishi, A., & Han, J. J. (2000). When baby Maisy came to school: Mothers’ interview styles and preschoolers’ event memories. *Cognitive Development*, 15(1), 99–114. [https://doi.org/10.1016/S0885-2014\(00\)00019-8](https://doi.org/10.1016/S0885-2014(00)00019-8).
- Leichtman, M. D., Wang, Q., & Pillemer, D. B. (2003). Cultural variations in interdependence and autobiographical memory: Lessons from Korea, China, India, and the United States. In R. Fivush & C. A. Haden (Eds.), *Autobiographical memory and the construction of a narrative self: Developmental and cultural perspectives* (pp. 73–97). Mahwah, NJ: Lawrence Erlbaum Associates.
- Li, H. Z. (2002). Culture, gender and self–close–other(s) connectedness in Canadian and Chinese samples. *European Journal of Social Psychology*, 32(1), 93–104. <https://doi.org/10.1002/ejsp.63>.
- Li, J. (2006). Self in learning: Chinese adolescents’ goals and sense of agency. *Child Development*, 77(2), 482–501. <https://doi.org/10.1111/j.1467-8624.2006.00883.x>.
- Lin, J. W. (2003). Temporal reference in mandarin Chinese. *Journal of East Asian Linguistics*, 12(3), 259–311.

- Malda, M., van de Vijver, F. J. R., & Temane, Q. M. (2010). Rugby versus Soccer in South Africa: Content familiarity contributes to cross-cultural differences in cognitive test scores. *Intelligence*, *38*(6), 582–595. <https://doi.org/10.1016/j.intell.2010.07.004>.
- Markus, H. R., & Hamedani, M. G. (2007). Sociocultural psychology: The dynamic interdependence among self systems and social systems. In S. Kitayama & D. Cohen (Eds.), *Handbook of cultural psychology* (pp. 3–39). New York, NY: Guilford Press.
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*(2), 224–253. <https://doi.org/10.1037/0033-295X.98.2.224>.
- Markus, H. R., & Kitayama, S. (2010). Cultures and selves: A cycle of mutual constitution. *Perspectives on Psychological Science*, *5*(4), 420–430. <https://doi.org/10.1177/1745691610375557>.
- Marsh, E. J., Eslick, A. N., & Fazio, L. K. (2008). False memories. In H. L. Roediger, III & J. Byrne (Eds.), *Learning and memory: A comprehensive reference, Vol4: Vol. 2.* (pp. 221–238). Oxford: Elsevier.
- McCrink, K., Shaki, S., & Berkowitz, T. (2014). Culturally driven biases in preschoolers' spatial search strategies for ordinal and non-ordinal dimensions. *Cognitive Development*, *30*, 1–14. <https://doi.org/10.1016/j.cogdev.2013.11.002>.
- Medeiros, W., Torro-Alves, N., Malloy-Diniz, L. F., & Minervino, C. M. (2016). Executive functions in children who experience bullying situations. *Frontiers in Psychology*, *7*(9), 1197. <https://doi.org/10.3389/fpsyg.2016.01197>.
- Mullen, M. K., & Yi, S. (1995). The cultural context of talk about the past: Implications for the development of autobiographical memory. *Cognitive Development*, *10*(3), 407–419. [https://doi.org/10.1016/0885-2014\(95\)90004-7](https://doi.org/10.1016/0885-2014(95)90004-7).
- Nampijja, M., Apule, B., Lule, S., Akurut, H., Muhangi, L., Elliott, A. M., et al. (2010). Adaptation of western measures of cognition for assessing 5-year-old semi-urban Ugandan children. *British Journal of Educational Psychology*, *80*(1), 15–30. <https://doi.org/10.1348/000709909X460600>.
- Nelson, K., & Fivush, R. (2004). The emergence of autobiographical memory: A social cultural developmental theory. *Psychological Review*, *111*(2), 486–511. <https://doi.org/10.1037/0033-295X.111.2.486>.
- Ngo, C. T., Newcombe, N. S., & Olson, I. R. (2018). The ontogeny of relational memory and pattern separation. *Developmental Science*, *21*(2), 1–11.
- Niraula, S., & Mishra, R. C. (2001). Memory for objects and their spatial location in rural and urban Nepalese children. *Psychological Studies*, *46*(1–2), 7–13.
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review*, *108*(2), 291–310. <https://doi.org/10.1037/0033-295X.108.2.291>.
- Norimatsu, H., Blin, R., Hashiya, K., Sorsana, C., & Kobayashi, H. (2014). Understanding of others' knowledge in French and Japanese children: A comparative study with a disambiguation task on 16–38-month-olds. *Infant Behavior & Development*, *37*(4), 632–643. <https://doi.org/10.1016/j.infbeh.2014.08.006>.
- Oishi, S., Jaswal, V. K., Lillard, A. S., Mizokawa, A., Hitokoto, H., & Tsutsui, Y. (2014). Cultural variations in global versus local processing: A developmental perspective. *Developmental Psychology*, *50*(12), 2654–2665. <https://doi.org/10.1037/a0038272>.
- Pathman, T., Larkina, M., Burch, M. M., & Bauer, P. J. (2013). Young children's memory for the times of personal past events. *Journal of Cognition and Development*, *14*(1), 120–140. <https://doi.org/10.1080/15248372.2011.641185>.
- Peña, E. D. (2007). Lost in translation: Methodological considerations in cross-cultural research. *Child Development*, *78*(4), 1255–1264. <https://doi.org/10.1111/j.1467-8624.2007.01064.x>.

- Peterson, C., Wang, Q., & Hou, Y. (2009). "When I was little": Childhood recollections in Chinese and European Canadian grade school children. *Child Development, 80*(2), 506–518. <https://doi.org/10.1111/j.1467-8624.2009.01275.x>.
- Qi, H., Jiang, P., Ledlie, S., Yao, Y., Roberts, K. P., & Chen, L. (2018). A cross-cultural investigation of the developmental trends of children and emerging adults' self-construal. In *Short paper presented at the 29th international congress of applied psychology, Montreal, Canada*.
- Qi, H., & Roberts, K. P. (2016). The influences of language on Chinese children's self-descriptions. Department of Psychology, Wilfrid Laurier University Waterloo, ON, Canada: Unpublished raw data.
- Qi, H., & Roberts, K. P. (2017). *The effects of cultural background and self-construal on the underlying mechanisms of children's memory*. Unpublished manuscript, Waterloo, ON, Canada: Department of Psychology, Wilfrid Laurier University.
- Reese, E., Hayne, H., & MacDonald, S. (2008). Looking back to the future: Māori and Pakeha mother-child birth stories. *Child Development, 79*(1), 114–125. <https://doi.org/10.1111/j.1467-8624.2007.01114.x>.
- Reese, E., Meins, E., Fernyhough, C., & Centifanti, L. (2018). Origins of mother-child reminiscing style. *Development and Psychopathology, 1*–12. <https://doi.org/10.1017/S0954579418000172>.
- Reese, E., & Neha, T. (2015). Let's Kōrero (talk): The practice and functions of reminiscing among mothers and children in Māori families. *Memory, 23*(1), 99–110. <https://doi.org/10.1080/09658211.2014.929705>.
- Reese, E., & Newcombe, R. (2007). Training mothers in elaborative reminiscing enhances children's autobiographical memory and narrative. *Child Development, 78*(4), 1153–1170. <https://doi.org/10.1111/j.1467-8624.2007.01058.x>.
- Roberts, K. P. (2002). Children's ability to distinguish between memories from multiple sources: Implications for the quality and accuracy of eyewitness statements. *Developmental Review, 22*(3), 403–435. [https://doi.org/10.1016/S0273-2297\(02\)00005-9](https://doi.org/10.1016/S0273-2297(02)00005-9).
- Roberts, K. P., Evans, A. D., & Duncanson, S. (2016). Binding an event to its source at encoding improves children's source monitoring. *Developmental Psychology, 52*(12), 2191–2201. <https://doi.org/10.1037/dev0000213>.
- Roberts, K. P., & Powell, M. B. (2006). The consistency of false suggestions moderates children's reports of a single instance of a repeated event: Predicting increases and decreases in suggestibility. *Journal of Experimental Child Psychology, 94*(1), 68–89. <https://doi.org/10.1016/j.jecp.2005.12.003>.
- Roberts, K. P., Qi, H., & Zhang, H. H. (2016). Challenges facing East Asian immigrant children in sexual abuse cases. *Canadian Psychology/Psychologie Canadienne, 57*(4), 300–307. <https://doi.org/10.1037/cap0000066>.
- Rogoff, B., & Mistry, J. (1985). Memory development in cultural context. In M. Pressley & C. J. Brainerd (Eds.), *Cognitive learning and memory in children* (pp. 117–142). New York, NY: Springer.
- Rogoff, B., & Waddell, K. J. (1982). Memory for information organized in a scene by children from two cultures. *Child Development, 53*(5), 1224–1228. <https://doi.org/10.2307/1129009>.
- Rosenqvist, J., Lahti-Nuutila, P., Urgesi, C., Holdnack, J., Kemp, S. L., & Laasonen, M. (2017). Neurocognitive functions in 3- to 15-year-old children: An international comparison. *Journal of the International Neuropsychological Society, 23*(4), 367–380. <https://doi.org/10.1017/S1355617716001193>.
- Rothbaum, F., Weisz, J., Pott, M., Miyake, K., & Morelli, G. (2000). Attachment and culture: Security in the United States and Japan. *American Psychologist, 55*(10), 1093–1104. <https://doi.org/10.1037/0003-066X.55.10.1093>.



- Sahin, B., & Mebert, C. J. (2013). The role of culture and self-construal in autobiographical memories of US and Turkish college students. *Memory, 21*(8), 1004–1017. <https://doi.org/10.1080/09658211.2013.774418>.
- Sahin-Acar, B., & Leichtman, M. D. (2015). Mother–child memory conversations and self-construal in Eastern Turkey, Western Turkey and the USA. *Memory, 23*(1), 69–82. <https://doi.org/10.1080/09658211.2014.935437>.
- Santos, F. H., Mello, C. B., Bueno, O. F. A., & Dellatolas, G. (2005). Cross-cultural differences for three visual memory tasks in Brazilian children. *Perceptual and Motor Skills, 101*(2), 421–433. <https://doi.org/10.2466/PMS.101.6.421-433>.
- Santos, H. C., Varnum, M. E. W., & Grossmann, I. (2017). Global increases in individualism. *Psychological Science, 28*(9), 1228–1239. <https://doi.org/10.1177/0956797617700622>.
- Schneider, L., Price, H. L., Roberts, K. P., & Hedrick, A. M. (2011). Children's episodic and generic reports of alleged abuse. *Applied Cognitive Psychology, 25*(6), 862–870. <https://doi.org/10.1002/acp.1759>.
- Setoh, P., Qin, L., Zhang, X., & Pomerantz, E. M. (2015). The social self in early adolescence: Two longitudinal investigations in the United States and China. *Developmental Psychology, 51*(7), 949–961. <https://doi.org/10.1037/a0039354>.
- Shahabi, S. R., Abad, F. J., & Colom, R. (2014). Short-term storage is a stable predictor of fluid intelligence whereas working memory capacity and executive function are not: A comprehensive study with Iranian schoolchildren. *Intelligence, 44*, 134–141. <https://doi.org/10.1016/j.intell.2014.04.004>.
- Shahabi, S. R., Ejei, J., Azadfallah, P., & Farzad, V. (2014). Underling mechanism of relationship between working memory and fluid intelligence. *Journal of Psychology, 18*(1), 3–24.
- Shebani, M. F. A., van de Vijver, F. J. R., & Poortinga, Y. H. (2008). Memory development in Libyan and Dutch school children. *European Journal of Developmental Psychology, 5*(4), 419–438. <https://doi.org/10.1080/17405620701343204>.
- Shweder, R. A., Goodnow, J. J., Hatano, G., LeVine, R. A., Markus, H. R., & Miller, P. J. (2006). The cultural psychology of development: One mind, many mentalities. In N. Eisenberg, W. Damon, & R. Lerner (Eds.), *Handbook of child psychology* (6th ed., pp. 716–792). Hoboken, NJ: John Wiley & Sons.
- Spiegler, O., & Leyendecker, B. (2017). Balanced cultural identities promote cognitive flexibility among immigrant children. *Frontiers in Psychology, 8*(5), 1579. <https://doi.org/10.3389/fpsyg.2017.01579>.
- Stevenson, C. E., Heiser, W. J., & Resing, W. C. M. (2016). Dynamic testing: Assessing cognitive potential of children with culturally diverse backgrounds. *Learning and Individual Differences, 47*, 27–36. <https://doi.org/10.1016/j.lindif.2015.12.025>.
- Tessler, M., & Nelson, K. (1996). Making memories: The influence of joint encoding on later recall by young children. In K. Pezdek & W. P. Banks (Eds.), *The recovered memory/false memory debate; the recovered memory/false memory debate* (pp. 101–120). San Diego, CA: Academic Press. chapter xv, 394 pp.
- Thorell, L. B., Veleiro, A., Siu, A. F. Y., & Mohammadi, H. (2013). Examining the relation between ratings of executive functioning and academic achievement: Findings from a cross-cultural study. *Child Neuropsychology, 19*(6), 630–638. <https://doi.org/10.1080/09297049.2012.727792>.
- Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological Review, 96*(3), 506–520. <https://doi.org/10.1037/0033-295X.96.3.506>.
- Tsethlikai, M. (2010). The influence of a friend's perspective on American Indian children's recall of previously misconstrued events. *Developmental Psychology, 46*(6), 1481–1496. <https://doi.org/10.1037/a0020725>.
- Tulving, E. (2002). Episodic memory: From mind to brain. *Annual Review of Psychology, 53*(1), 1–25. <https://doi.org/10.1146/annurev.psych.53.100901.135114>.

- United Nations High Commissioner for Refugees (UNHCR), Figures at a Glance (2018). Retrieved from <http://www.unhcr.org/en-us/figures-at-a-glance.html>.
- Varnum, M. E. W., Grossmann, I., Kitayama, S., & Nisbett, R. E. (2010). The origin of cultural differences in cognition: The social orientation hypothesis. *Current Directions in Psychological Science*, 19(1), 9–13. <https://doi.org/10.1177/0963721409359301>.
- Wang, Q. (2001). Culture effects on adults' earliest childhood recollection and self-description: Implications for the relation between memory and the self. *Journal of Personality and Social Psychology*, 81(2), 220–233. <https://doi.org/10.1037/0022-3514.81.2.220>.
- Wang, Q. (2004). The emergence of cultural self-constructs: Autobiographical memory and self-description in European American and Chinese children. *Developmental Psychology*, 40(1), 3–15. <https://doi.org/10.1037/0012-1649.40.1.3>.
- Wang, Q. (2006). Relations of maternal style and child self-concept to autobiographical memories in Chinese, Chinese immigrant, and European American 3-year-olds. *Child Development*, 77(6), 1794–1809. <https://doi.org/10.1111/j.1467-8624.2006.00974.x>.
- Wang, Q. (2007). “Remember when you got the big, big bulldozer?” Mother-child reminiscing over time and across cultures. *Social Cognition*, 25(4), 455–471. <https://doi.org/10.1521/soco.2007.25.4.455>.
- Wang, Q. (2009). Once upon a time: Explaining cultural differences in episodic specificity. *Social and Personality Psychology Compass*, 3(4), 413–432. <https://doi.org/10.1111/j.1751-9004.2009.00182.x>.
- Wang, Q. (2011). Autobiographical memory and culture. *Online Readings in Psychology and Culture*, 5(2), 2.
- Wang, Q., & Fivush, R. (2005). Mother-child conversations of emotionally salient events: Exploring the functions of emotional reminiscing in European-American and Chinese families. *Social Development*, 14(3), 473–495. <https://doi.org/10.1111/j.1467-9507.2005.00312.x>.
- Wang, Q., Hutt, R., Kulkofsky, S., McDermott, M., & Wei, R. (2006). Emotion situation knowledge and autobiographical memory in Chinese, immigrant Chinese, and European American 3-year-olds. *Journal of Cognition and Development*, 7(1), 95–118. [https://doi.org/10.1207/s15327647jcd0701\\_5](https://doi.org/10.1207/s15327647jcd0701_5).
- Wang, Q., & Leichtman, M. D. (2000). Same beginnings, different stories: A comparison of American and Chinese children's narratives. *Child Development*, 71(5), 1329–1346. <https://doi.org/10.1111/1467-8624.00231>.
- Wang, Q., Leichtman, M. D., & Davies, K. I. (2000). Sharing memories and telling stories: American and Chinese mothers and their 3-year-olds. *Memory*, 8(3), 159–178. <https://doi.org/10.1080/096582100387588>.
- Wang, Q., Peterson, C., & Hou, Y. (2010). Children dating childhood memories. *Memory*, 18(7), 754–762. <https://doi.org/10.1080/09658211.2010.508749>.
- Wang, Q., & Song, Q. (2017). He says, she says: Mothers and children remembering the same events. *Child Development*, 89, 2215–2229. <https://doi.org/10.1111/cdev.12927>.
- Weinsheimer, C. C., Coburn, P. I., Chong, K., MacLean, C. L., & Connolly, D. A. (2017). Perceptions of credibility for a memory report of a single versus repeated event. *Applied Cognitive Psychology*, 31(4), 414–423. <https://doi.org/10.1002/acp.3340>.
- Yao, X. (2000). *An introduction to confucianism*. Cambridge, UK: University Press.
- Yu, R. (2002). On the reform of elementary school education in China. *Educational Exploration*, 129, 56–57.

## Further reading

- Chasiotis, A., Bender, M., Kiessling, F., & Hofer, J. (2010). The emergence of the independent self: Autobiographical memory as a mediator of false belief understanding and sociocultural motive orientation in Cameroonian and German preschoolers. *Journal of Cross-Cultural Psychology*, 41(3), 368–390. <https://doi.org/10.1177/0022022110361705>.

- Cross, S. E., Morris, M. L., & Gore, J. S. (2002). Thinking about oneself and others: The relational-interdependent self-construal and social cognition. *Journal of Personality and Social Psychology*, 82(3), 399–418. <https://doi.org/10.1037/0022-3514.82.3.399>.
- Gabriel, S., & Gardner, W. L. (1999). Are there “his” and “hers” types of interdependence? The implications of gender differences in collective versus relational interdependence for affect, behavior, and cognition. *Journal of Personality and Social Psychology*, 77(3), 642–655. <https://doi.org/10.1037/0022-3514.77.3.642>.
- Hill, M. D. (2013). Growing up Quechua: Ethnic identity, narrative, and the cultural politics of childhood migration in Cusco, Peru. *Childhood: A Global Journal of Child Research*, 20(3), 383–397. <https://doi.org/10.1177/0907568213482148>.
- Kormi-Nouri, R., Shojaei, R., Moniri, S., Gholami, A., Moradi, A., Akbari-Zardkhaneh, S., et al. (2008). The effect of childhood bilingualism on episodic and semantic memory tasks. *Scandinavian Journal of Psychology*, 49(2), 93–109. <https://doi.org/10.1111/j.1467-9450.2008.00633.x>.
- Lessenich, S., Ekerdt, D. J., Münch, A., Koss, C., Li, A. Y., & Fung, H. H. (2018). The dog that didn't bark: The challenge of cross-cultural qualitative research on aging. *Journal of Aging Studies*, 47, 66–71. <https://doi.org/10.1016/j.jaging.2018.02.001>.
- MacDonald, J. A., Sandry, J., & Rice, S. (2012). Self-construal priming affects speed of retrieval from short-term memory. *PLoS One*, 7(11), 4. <https://doi.org/10.1371/journal.pone.0050007>.
- Maseko, M. (2003). A young parent's anxieties in raising her infant in a non-traditional family structure. *Journal of Child and Adolescent Mental Health*, 15(2), 77–80. <https://doi.org/10.2989/17280580309486551>.
- Petterson, B., & Paterson, H. M. (2012). Culture and conformity: The effects of independent and interdependent self-construal on witness memory. *Psychiatry, Psychology and Law*, 19(5), 735–744. <https://doi.org/10.1080/13218719.2011.615821>.
- Popova, Y. (2007). On human temporality—Time, language, and a sense of self. In B. Wallace, A. Ross, J. Davies, & T. Anderson (Eds.), *The mind, the body and the world: Psychology after cognitivism? The mind, the body and the world: Psychology after cognitivism?* (pp. 257–268). Charlottesville, VA: Imprint Academic.
- Sahin, B. (2011). *The effect of culture and self-construal on memory development: Mother-child conversations in Eastern Turkey, Western Turkey and the United States (Doctoral dissertations)*. Durham, NC: University of New Hampshire. 562, Retrieved from <https://scholars.unh.edu/dissertation/562>.
- Sui, J., Zhu, Y., & Chiu, C. (2007). Bicultural mind, self-construal, and self- and mother-reference effects: Consequences of cultural priming on recognition memory. *Journal of Experimental Social Psychology*, 43(5), 818–824. <https://doi.org/10.1016/j.jesp.2006.08.005>.