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''When I Was Little'': Childhood Recollections in Chinese and European Canadian Grade School Children

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Recollection of early childhood experiences was investigated in 225 European Canadian and 133 Chinese children (ages 8, 11, and 14) by a memory fluency task that measured accessibility of multiple early memories and elicited the earliest memory. Younger children provided memories of events that occurred at earlier ages than older children. Furthermore, Canadian children produced more memories and had an earlier age of first memory than did Chinese children, with cultural differences in both measures increasing with age. It appears that while adultlike childhood amnesia is still emerging among Canadian children, Chinese children by age 14 already resemble adults. Content of Canadian versus Chinese children's memories reflected an autonomous versus relational self-construal. Results are discussed in terms of sociocultural influences on memory.

Childhood amnesia, also called infantile amnesia, is the absence or scarcity of memories about very early life events (MacDonald, Uesiliana, & Hayne, 2000; Peterson, 2002). This phenomenon presents an intriguing dilemma: While children as young as age 2 or 3 often exhibit impressive abilities to retain personal event information over extended periods of time, especially with adults' assistance (Harley & Reese, 1999; Nelson & Fivush, 2004), most adults cannot consciously recall events that occurred before they were age 3.5 (Rubin, 2000). It appears that those early memories become lost or inaccessible during development. A developmental perspective is thus critical to unravel this dilemma by examining the emergence of childhood amnesia and its underlying mechanisms. However, most research on childhood amnesia to date has focused on adult populations. To address this deficiency, we investigated childhood recollections in grade school children from European Canadian and Chinese cultures. Situating the study in a cross-cultural context further allows us to investigate universal and culture-specific variables in the emergence of childhood amnesia.

Issues in Extant Research

Extant research has suggested that childhood amnesia does not appear in an all-or-none fashion but involves deviations from delay-related forgetting curves (rather than being entirely accounted for by the distance between encoding and retrieval), and there exists a wide range of individual variations in accessibility to early memories (Peterson, 2002). The few studies to date on childhood recollections in children further suggest that childhood amnesia may develop gradually with age, with early memories decreasing in accessibility as children get older and eventually becoming inaccessible by adulthood. Consequently, a ''full adult form'' of childhood amnesia may not be observed

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until a certain age in development. In the first systematic study of childhood amnesia in children between 6 and 19 years of age, Peterson, Grant, and Boland (2005) documented important age-related differences, where the age of earliest memory of older children was later than that of younger children. This was replicated and extended by Hayne and her colleagues (Jack, MacDonald, Reese, & Hayne, 2009; Tustin & Hayne, 2008), who also found an increase in the age of earliest memory with increasing age of respondents. In addition, 7- and 8-year-olds have been found to recall considerable information about salient events that took place at ages 2 and 3 (Peterson & Parsons, 2005; Peterson & Whalen, 2001; Wang, 2004), and Cleveland and Reese (2008) found that when 5.5-year-old children were reinterviewed about a range of events about which they had been interviewed earlier, they could still recall some events occurring before age 3.5, the average age of earliest memory among adults. Together, these studies suggest that the location in time of one's earliest memory shifts to an older age as children get older. It is not clear, however, at what age point a full adult form of childhood amnesia comes to exist.

The most commonly used method for studying childhood amnesia is the age of earliest memory, although the earliest memories people retrieve—and thus the reported age of the memories—often vary depending on the nature of the tasks and the type of questions asked to elicit the memories (Jack & Hayne, 2007; Wang, 2006a). Some researchers argue that a better understanding of childhood amnesia can be derived by looking at not only the single earliest memory that a person can identify, but also the accessibility of a range of memories from the early years (Nelson & Fivush, 2004). To investigate the accessibility of early memories, researchers have asked adults to recall a number of memories from early childhood or to recall specific early-occurring target events (MacDonald et al., 2000; Mullen, 1994; Rubin, 2000). A method recently developed by Wang, Conway, and Hou (2004), termed the *memory fluency task*, is to ask adults to recall as many memories from their early childhood as they can within a timed period. This method allows the examination of both the age of earliest memory and the ability to access readily memories from the period of childhood amnesia more generally. In the present study, we used the memory fluency method to examine recollections of early childhood experiences among children.

Individual and Cultural Variables in Childhood Amnesia

A range of factors are believed to play a role in childhood amnesia, including the emergence of a cognitive sense of self (Conway & Pleydell-Pearce, 2000; Howe & Courage, 1997; Welsh-Ross, 1995), acquisition of language and narrative skills (Peterson & Rideout, 1998), neurobiological maturation (Newcombe, Lloyd, & Ratliff, 2007), and metacognitive facilities such as theory of mind (Perner & Ruffman, 1995; Welsh-Ross, 1995). One theoretical account that has received considerable recent attention emphasizes social interaction, particularly early parent–child memory sharing (for a review, see Nelson & Fivush, 2004). In this account the waning of childhood amnesia and the concomitant emergence of autobiographical memory is facilitated through parent–child conversations about events in children's lives. In particular, the use of elaborations is found to be a critical variable affecting children's developing autobiographical memory (Fivush, Haden, & Reese, 2006). High-elaborative conversations resemble storytelling, where parents supplement children's contributions with rich embellished information and feedback to scaffold children in the coconstruction of elaborate, coherent narratives of the past. In contrast, low-elaborative conversations are like memory tests, where parents simply ask and repeat pointed questions in an attempt to elicit specific answers from children. Research has consistently demonstrated that parents who use an elaborative reminiscing style early on directly facilitate children's abilities to recall personal experiences over the long term (Harley & Reese, 1999; Leichtman, Pillemer, Wang, Koreishi, & Han, 2000; Peterson & McCabe, 2004). Conceivably, through elaborative memory conversations with their parents, young children learn to use linguistic and narrative codes to structure and reinstate memory information, and their memories are likely to be well consolidated and maintained over a long period of time (Nelson & Fivush, 2004). As preliminary support, Jack et al. (2009) found that maternal high-elaborative style during early childhood predicted an earlier age of adolescents' first memories in a New Zealand sample.

This theoretical approach also provides potential explanations for some of the group variations in early memory, including those related to culture. When asked to recall their earliest childhood memory, Asians report events dating from more than 6 months later than do Europeans and European Americans, who remember earliest events

occurring, on average, at age 3.5 (MacDonald et al., 2000; Mullen, 1994; Wang, 2001a). Also, compared with Chinese adults, European American and British adults are able to access quickly a greater number of early childhood memories (Wang et al., 2004). In addition, European Americans, both children and adults, are more likely than their Asian counterparts to recall specific, one-time events and focus on their own roles and perspectives whereas Asians are more likely to recall generic, repeated events as well as events involving social groups (Han, Leichtman, & Wang, 1998; Wang, 2001a, 2004; Wang & Conway, 2004). Research on parent–child memory sharing has further shown that North American mothers frequently engage in high-elaborative memory conversations with their children and focus on the child's roles and predilections in the memory events, whereas Asian mothers tend to initiate low-elaborative conversations and emphasize social interactions and group activities (Fivush & Wang, 2005; Minami & McCabe, 1995; Mullen & Yi, 1995; Wang, 2001b; Wang, Leichtman, & Davies, 2000). These family practices of memory sharing that vary in elaboration and content focus are found to serve as a potent mediator in explaining cultural differences where North American preschoolers recall more detailed and self-focused autobiographical memories than do Chinese preschoolers (Wang, 2006b, 2007; Wang et al., 2000). And in line with the socio-interactionist theory (Nelson & Fivush, 2004), over the long term, the high-elaborative, child-centered memory conversations in North American families may facilitate children to consolidate better their early memories and to retain these memories for a longer period of time. In other words, compared with Asian children, North American children may be able not only to retrieve earlier and a greater number of memories from their early childhood, but also have slower decline in memory accessibility with age and thus later emergence of an adult form of childhood amnesia.

The Present Study

The present study extends extant research in a number of important ways. It focuses on early memories in children. To our knowledge, not only is research rare on childhood amnesia in children, but this is the first investigation of children's memory fluency for early events. Children of ages 8, 11, and 14 were asked to recall in a 4-min period as many memory events as they could that took place before they went to school. We used school entry to define the time frame of the recall because it is an important landmark event in a child's life and can thus assist memory search (Mullen, 1994). An unavoidable difference between groups is that Canadian children start formal schooling at age 5, when children attend kindergarten. In China, although children also go to kindergarten, formal schooling is considered starting at Grade 1, when children are around age 6. We discuss the methodological implications in the Results and Discussion sections. The particular age groups were chosen because prior research with Canadian children suggests that middle childhood through early adolescence may be a critical period during which the adult form of childhood amnesia starts to emerge, and by late adolescence, adultlike childhood amnesia has taken place (Peterson et al., 2005). Both how early children could recall their single first memory and how easily they could retrieve multiple early memories were assessed to index children's memory accessibility. We focused on children of European Canadian and Chinese cultures based on prior research that showed different memory-sharing practices in these cultures, and including children from both of these divergent cultures helps to delineate the influence of these memory-sharing practices on early memory development. Finally, parents were asked about the veracity of their children's recollections and the age at which the described events took place. Prior research with Canadian children found that parents overwhelmingly confirmed children's memories (Peterson et al., 2005), but such data have not been collected for Chinese children.

Our hypotheses were as follows: (a) Since there is no extant research on memory fluency for the retrieval of early childhood memories in children, we had little basis for predicting age relations when the task involves retrieving multiple memories. Earlier research (Peterson et al., 2005; Tustin & Hayne, 2008) suggested that younger children can retrieve earlier first memories than can older children, but it is unknown whether younger children can more readily access multiple early memories. A memory fluency task is more challenging than trying to retrieve a single memory and requires a child to stay on task for several minutes, which may be more difficult for young children to do. Thus, we had no a priori predictions about children's memory fluency performance. On the other hand, we expected that, regardless of age and culture, children would retrieve a greater number of memories from a later age, consistent with the phenomenon of childhood amnesia observed in adults. (b) We also expected younger children to have an earlier

age of first memory than older children, parallel to the findings of Peterson et al. (2005) and Tustin and Hayne (2008). (c) The age of earliest memory and the general accessibility of multiple memories have never been directly compared; furthermore, it is possible that the relation between these two measures may differ for children of different ages and/or cultures. We assumed that both measures tap into the ability to access early memories (Wang et al., 2004), and therefore, we predicted that there would be a strong correlation between these measures such that children who had an earlier first memory would also recall more memories regardless of child age and culture. (d) In line with the sociointeractionist theory delineated by Nelson and Fivush (2004) that emphasizes the influence of divergent cultural socialization practices on the development of autobiographical memory, we expected that European Canadian children would access earlier first memories and more childhood memories generally than Chinese children, regardless of age. We also expected a later emergence of an adult form of childhood amnesia in Canadian than Chinese children. (e) We anticipated that a greater proportion of memories by Canadian children of all ages would focus on the children themselves whereas Chinese children's memories would be more likely to concern social activities, consistent with prior research that has shown this divergent cultural pattern in both adults (Wang, 2001a; Wang & Conway, 2004) and children (Han et al., 1998; Wang, 2004; Wang et al., 2000).

Method

Participants

The participants were 225 Western-European Canadian children from Newfoundland, Canada, and 133 Chinese children from Beijing and Zhejiang, China. In both countries children were recruited through local elementary and junior high schools and were primarily from middle-class backgrounds. Parents gave informed consent. Canadian children included seventy-one 8-year-olds (mean age = 8.00, *SD* = 0.53; all in Grade 2; 34 girls and 37 boys), sixty-seven 11-year-olds (mean age = 11.00, *SD* = 0.57; all in Grade 5; 36 girls and 31 boys), and eighty-seven 14-year-olds (mean age = 14.33, *SD* = 0.69; all in Grades 8 or 9; 48 girls and 39 boys). According to Statistics Canada, the population from which the participants were drawn is 97% Caucasian of Western European descent. Chinese children included forty-four 8-year-olds (mean age = 7.86, *SD* = 0.52; all in Grade 2; 19 girls and 25 boys), forty-four 11-year-olds (mean age = 10.98, *SD* = 0.59; all in Grade 5; 24 girls and 20 boys), and forty-five 14-year-olds (mean age = 15.50, *SD* = 0.65; all in junior high Grades 2 or 3, equivalent to Canadian Grades 8 or 9; 25 girls and 19 boys). Children's parents were asked for permission to telephone them after their children's interview to verify the memories their children had recalled, and overall, 86% of Canadian parents and 100% of Chinese parents were available for verification.

Procedure

Native female researchers collected data in each country. Children were individually interviewed once at school. At the interview session, the researcher first chatted with children to establish rapport. She then explained to children that they would be timed for 4 min during which time they should try to recall as many early memories as possible from before they went to school. The researcher further emphasized to children that ''I want to know as many memories as you can tell me from when you were a little girl (boy). As many things as you can think of. It can be anything at all. So, how about you start telling me what you remember? Let's start *now*.'' As soon as children began speaking, the researcher started the stop watch and the tape recorder. Once children provided sufficient information about a particular memory, often in one or two sentences, the researcher prompted them to move on to the next one with encouraging remarks (''Yeah, that's great.'' ''What else do you remember?'' ''Tell me about something else''). The recall period lasted for exactly 4 min. After the timed recall period, the researcher asked children to identify their age at the time of each event recalled. They were asked to provide how old they had been in years, and the researcher asked ancillary questions that would help her (in conjunction with knowing the child's date of birth) determine children's age in months as well as years (e.g., Was it summer or winter? Near a special occasion like Christmas, their birthday, Easter, Halloween, or Chinese New Year, Moon Festival, the ''6.1'' Children's Holiday?). Children were also asked how they felt when the event happened. At the end of the interview, children were asked what their earliest childhood memory was.

Parents who had given permission to the researchers to telephone them to verify their children's memories were called between 1 and 4 months (mean delay = 1.5 month) after their

child's interview. Each of their child's memories was described and the parent was asked (a) if the event to their knowledge had happened; (b) if they had no knowledge of the event, would they deem it to be reasonable; (c) or was it unlikely to have happened; and finally (d) how old the child was at the time of the event with an approximation to the nearest month or season.

Coding

The number of memories each child recalled was recorded. The memory that was earliest according to the ages that the children had identified was selected as their first memory. This could be the memory that children had explicitly identified as their first memory or, if one of their other memories occurred at a younger age, it was selected instead. In addition, each memory was classified according to the following categories:

Specificity. Memories were classified as *specific* if they were about a distinct one-time event that occurred at a specific time and place. In contrast, events that were scriptlike memories about repeated events were classified as *generic*. All memories were classified into one of these two mutually exclusive categories.

Age at the time of each memory. For each memory, children had been asked how old they had been at the time, and were prompted for ancillary information that would help us narrow down the child's age to a particular month as much as possible. Often the age spanned a range of months. For example, if the event happened in the summer when the child had been 3 and she was born at the beginning of February, she was between 3 years 4 months and 3 years 7 months at the time of the event. The midpoint for that range was selected as the child's age. If the child could only identify her age in years (e.g., ''I was 2''), then the midpoint (e.g., 2 years 6 months) was selected as the child's age.

Social orientation. Following previous studies (Wang, 2001a, 2004), memories were classified into three mutually exclusive categories on the basis of whom the memory was about. *Social memories* involved interactions with other people or about the child being part of a group such as the family, school, or peers (e.g., ''telling stories with friends''). *Individual memories* were about the child him- or herself (e.g., ''playing alone at home''). However, some memories were so short that they could not be classified as social versus individual, and these were put into the category of ''other.''

Content. The content of memories often differed depending on whether the memory was about social interactions, focused on the individual child, or lacked enough detail to be classified as either social or individual and thus was classified as a miscellaneous ''other'' memory. Each social or individual memory was further categorized into one of the following mutually exclusive categories. *Social memories* were classified as (a) *family events*, including outings, holiday celebrations, conflict between family members and separations from parents/siblings; (b) *school events*, including school discipline or conflict with schoolmates; (c) *play with friends* outside of school, including fighting with friends; (d) *toys/objects* that were part of group activities, including getting or giving a new toy or losing/breaking a toy; (e) *pets*, focusing on group play or group interaction with a pet; (f) *injury* to self or someone else in which group members played a role, including medical procedures and death of someone; (g) *transitions*, including first-time events or major changes for a social group (e.g., ''my family moved to Vancouver to live when I was three''); and (h) *sibling birth*, memories of the events surrounding a sibling's birth. *Individual memories* were classified as (a) *play* that the child did alone or mentioned no other people; (b) *emotion/cognition*, involving talking about a favorite food or toy; (c) *toys/objects* that the child played with alone, including receiving, losing, or breaking a prized toy; (d) *pets*, focusing on interactions by the child alone with a pet; (e) *injury* that occurred to the child, and other people were not mentioned; and (f) *transitions* and personal accomplishments in which the child only talked about the self (e.g., ''the first time I rode a bike without training wheels'').

Parental verification. Using parental information when asked ''Did the memory happen?'' each memory was coded as *yes it happened*, *it is reasonable that it happened*, *no it did not happen*, or *unknown*. The age of the first memory provided by children was compared with the age estimate provided by parents and noted by the difference in months.

Reliability

In each culture, two trained research assistants, both unaware of the hypotheses, independently coded 20% of the data set for reliability estimate. For the Canadian sample, Cohen's Kappas were .93 for memory specificity, .93 for social orientation, and .96 for content. For the Chinese sample, Kappas were .90 for the memory specificity, .92 for social

orientation, and .92 for content. One coder in each culture then coded the rest of the respective data.

Results

In connection with the hypotheses, we first present the number of memories children retrieved from their early years across the three grade levels in both cultures, followed by the number of specific memories they recalled. We also present data on the distribution of these early memories in terms of how old the child was at the time of the remembered events. Next, the age of children's earliest memory is analyzed, as well as the relation between children's age of earliest memory and the fluency of their memory retrieval. Then, we report results pertaining to the social orientation and content of the memories. Finally, we assess the degree of parental agreement with what children said. In all analyses, cross-cultural comparisons between European Canadian and Chinese children are made, as well as age and gender.

Frequency of Early Memories

The number of early memories provided by children as a function of culture and age is illustrated in Figure 1. A 2 (culture) × 3 (age) × 2 (gender) analysis of variance (ANOVA) showed that Canadian children (M = 8.09, SD = 3.84) produced more early memories than did Chinese children (M = 4.42, SD = 2.20), $F(1, 346) = 108.39$, $p < .001$, $\eta^2 = .239$. As well, there was a main effect of age, $F(2, 346) = 7.98$, $p < .001$, $\eta^2 = .044$. Both of these main effects were complicated by a Culture × Age interaction, $F(2, 346) = 11.82$, $p < .001$, $\eta^2 = .064$. As shown in Figure 1, although Canadian children provided more memories than Chinese children at age 8, $t(114) = 3.44$, $p = .001$, the cultural difference increased at age 11, $t(109) = 6.08$, $p < .001$, and age 14, $t(129) = 8.21$, $p < .001$. In addition, Tukey–Kramer honestly significant difference (HSD) tests (ps < .05) indicated that within the Canadian sample, 11- and 14-year-olds, who did not differ from each other, produced substantially more memories than did 8-year-olds. In contrast, Chinese 8- and 11-year-olds produced a comparable number of early memories whereas 14-year-olds recalled significantly fewer memories than did the younger groups. Gender was not a significant factor, either alone or in interaction with any other variable. Thus, boys and girls produced similar numbers of early memories at each age, within each culture.

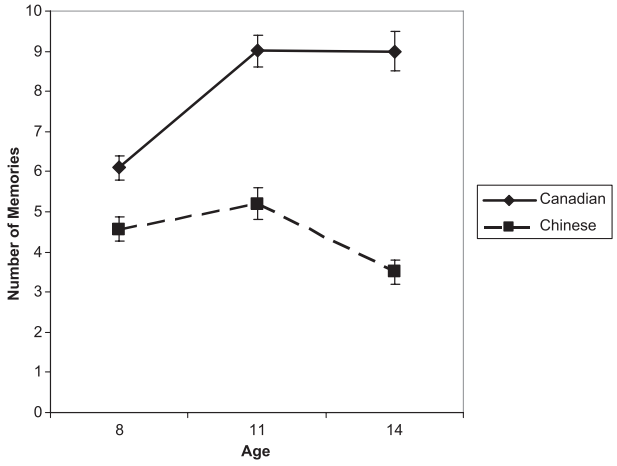

Figure 1. Number of early memories as a function of age and culture.

The number of specific memories children recalled was analyzed next. Table 1 lists the means of the number of specific memories as a function of culture and age. A 2 (culture) × 3 (age) × 2 (gender) ANOVA was calculated on the number of memories that were specific, and Canadian children produced more specific memories than did Chinese children, $F(1, 346) = 53.31$, $p < .001$, $\eta^2 = .134$. The main effect of age was also significant, $F(2, 346) = 4.88$, $p < .01$, $\eta^2 = .027$, whereby 8-year-olds recalled fewer specific memories than did 11- and 14-year-olds, who in turn did not differ from each other (HSD tests, ps < .05). There were no other significant effects.

Distribution of Early Memories

Each memory produced by the children was categorized by year in terms of the child's age at the time of the event. The distribution of the number of memories from each year of the child's early life is shown in Figure 2. As noted earlier, most Canadian children start school around age 5, when they enter kindergarten, whereas most Chinese children start school around age 6, when they

Table 1
Means and Standard Deviations for the Number of Specific Memories by Age and Culture

	Canadian		Chinese	
Age (in years)	*M*	*SD*	*M*	*SD*
8	3.73	2.23	2.13	1.60
11	4.82	2.67	3.20	2.19
14	4.87	3.12	2.25	1.48
All participants	4.50	2.77	2.53	1.84

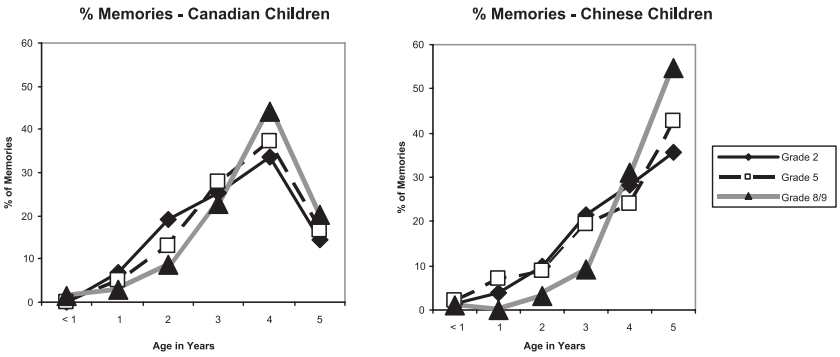

Figure 2. Number of memories that the child said occurred at each age for Canadian and Chinese children.

attend first grade. Thus, for Canadian children, the task of recalling memories from before they went to school would mean that they should focus on events taking place before age 5, whereas for Chinese children the task would be for them to focus on events taking place before age 6. This could explain the retrieval pattern that the average number of memories Canadian children recalled from age 5 dropped drastically given that many of the children were already in school at that age (see Figure 2). To control for this difference between the two culture groups, memories from age 5 were excluded from the subsequent analysis. In addition, because children of different age groups showed similar patterns of memory distribution, for simplicity the data were combined across ages within each culture in the analysis.

A mixed model 2 (culture) × 5 (age at time of memory) ANOVA was calculated on the number of memories provided from each age period, specifically, the period when the child was younger than 1 year of age as well as the periods when they were aged 1, 2, 3, and 4. There was a main effect of culture, with Canadians reporting more memories than Chinese children, $F(1, 352) = 168.52$, $p < .001$, $\eta^2 = .324$. There was also a significant linear trend for the age at time of memory, that is, more memories from later ages, $F(1, 352) = 895.22$, $p < .001$, $\eta^2 = .561$, as well as a significant linear trend for the interaction between culture and the number of memories from each year, $F(1, 356) = 71.33$, $p < .001$, linear fit $R^2 = .059$. Follow-up trend analyses for each culture alone revealed the linear fit $R^2 = .358$, $F(1, 224) = 305.27$, $p < .001$, for the Canadian sample, and the linear fit $R^2 = .156$, $F(1, 132) = 68.51$, $p < .001$, for the Chinese sample. Thus, compared with Chinese children, Canadian children not only recalled a greater number of memories but also showed a faster increase rate as their age at the time of memory increased.

Age of Earliest Memory

Figure 3 illustrates the age of children's earliest memory as a function of culture and age. A 2 (culture) × 3 (age) × 2 (gender) ANOVA showed main effects of culture, $F(2, 346) = 82.27$, $p < .001$, $\eta^2 = .192$, and age, $F(2, 346) = 15.73$, $p < .001$, $\eta^2 = .083$, qualified by an Age × Culture interaction, $F(2, 346) = 4.96$, $p < .01$, $\eta^2 = .028$. Across all age groups, Canadian children had earlier first memories than did Chinese children, and the cultural difference appeared to become larger among the oldest children, $t(114) = -3.90$, $p < .001$ for 8-year-olds; $t(109) = -3.90$, $p < .001$ for 11-year-olds; and $t(129) = -8.51$, $p < .001$ for 14-year-olds. As a whole, Canadian children's earliest memory was more than a year earlier than that of Chinese children (*M*s = 28.2 vs. 41.4 months). In addition, Canadian children in contiguous age groups did not differ, although the difference between 8- and 14-year-olds approached significance (HSD test,

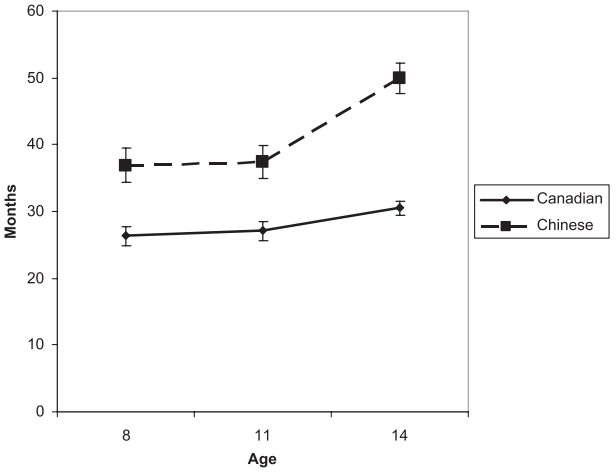

Figure 3. Age of earliest memory as a function of age and culture.

$p = .060$). For Chinese children, although the two younger groups did not differ from each other, they had significantly earlier memories than 14-year-olds (HSD tests, ps $< .05$). Furthermore, a significant gender effect showed that girls ($M = 33.5$ months, $SD = 13.4$) had earlier first memories than did boys ($M = 36.2$ months, $SD = 13.8$), $F(1, 346) = 5.54$, $p < .05$, $\eta^2 = .016$.

Relation Between Age of Earliest Memory and Total Number of Memories

To assess the relation between how early a child's first memory was and how many memories overall that he or she could produce, we computed Pearson's correlations between these two variables within each culture and age group. These correlations are found in Table 2. For Canadian children, the relation was significant for 8-year-olds and 14-year-olds; those children with earlier first memories could retrieve more memories overall. For Chinese children, across all age groups, those having earlier first memories were also able to retrieve a greater number of memories. Thus, as predicted, memory fluency and how early one's first memory was seemed to be highly related.

Table 2
Correlations Between Age of Earliest Memory and Total Number of Memories by Age and Culture

	Canadian		Chinese	
Age (in years)	*r*	*p*	*r*	*p*
8	−.346	.003**	−.456	.002**
11	.034	.782	−.495	.001**
14	−.247	.021*	−.559	.000***
All participants	−.101	.131	−.543	.000***

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

Memory Social Orientation and Content

Because the total number of memories differed across culture and age groups, to analyze the social orientation of memories we calculated for each child the percentage of memories that were classified as individual, social, or other, respectively (see Table 3). Because there were so few memories classified as ''other,'' these data were not included in subsequent analysis. A multivariate analysis of variance (MANOVA) was calculated that included two types of social orientation (percentages of individual memories and of social memories), with the between-subjects factors of culture, age, and gender. The main effect of social orientation was significant, Wilks's Exact $F(1, 346) = 19.73$, $p < .001$, as was the Social Orientation × Culture interaction, Wilks's Exact $F(1, 346) = 100.50$, $p < .01$. Follow-up 2 (culture) × 3 (age) × 2 (gender) ANOVAs were calculated for the percentages of individual and of social memories separately. The ANOVA for individual memories revealed only a significant effect of culture, $F(1, 346) = 85.22$, $p < .001$, $\eta^2 = .198$. Canadian children had almost twice the percentage of memories that focused on themselves as individuals as did Chinese children (Ms = 53.4% and 28.0%, respectively). The ANOVA for social memories also showed only a significant effect of culture, $F(1, 346) = 97.53$, $p < .001$, $\eta^2 = .220$; in contrast to the analysis on individual memories, Chinese children had a considerably higher percentage of social memories than did Canadian children (Ms = 66.7% and 39.4%, respectively). (To address the greater variability among the Chinese sample, we redid the analyses with the data transformed by a square root transformation and found the same pattern of results.)

Table 3
Mean Percentage of Individual, Social, and Other Memories by Age and Culture

	Canadian						Chinese					
	Individual		Social		Other		Individual		Social		Other	
Age (in years)	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
8	55.5	24.1	37.6	25.7	6.8	11.9	27.0	29.5	69.7	30.2	3.3	7.7
11	54.4	21.9	37.0	20.5	8.6	10.9	34.2	28.4	60.6	29.2	5.2	12.1
14	50.8	22.9	42.7	22.8	6.5	10.9	23.0	31.9	69.7	32.3	7.3	13.8
All participants	53.4	23.0	39.4	23.2	7.2	11.2	28.0	30.1	66.7	30.7	5.3	11.5

In terms of the content of children's memories, the most frequent content for Canadian children was a recollection of solitary play (24.1%), followed by family interactions (19.2%). The only other content category in which at least 10% of Canadian children's memories were placed was individual-oriented transitions (11.9%). For Chinese children, the most frequent content category was memories of family interactions (26.7%), followed by memories of school interactions (17.5%). Other categories in which at least 10% of Chinese children's memories were placed were individual play (11.7%), individual injury (11.2%), and play with friends (10.0%). Thus, if we look at the three most frequent categories of content of children's memories, two of the three categories that were most frequently recalled by Chinese children involved a group, whereas only one of the three most frequent categories for Canadian children did.

Parental Verification

For those memories for which we had parental confirmation, the number and percentage of memories that did happen, were reasonable (although parents had no specific knowledge), did not happen, or were unknown to the parent are shown in Table 4. Memories classified as ''unknown'' are not included in subsequent analysis because they were so infrequent in the Canadian sample and were absent from the Chinese sample. Across the entire sample, a great majority of the memories provided by children were verified by their parents as having happened (79.5%) or being reasonable (16%), and very few memories (4.1%) were disputed by the parents, $\chi^2(2, N = 2{,}171) = 2{,}158.36$, $p < .001$. However, estimated ages of children at the time of their first memory differed between children and parents, $t(320) = -4.04$, $p < .001$, with children (mean age = 32.8 months) having younger estimates of their age than did their parents (mean age = 36.7 months). A 2 (culture) × 3 (age) × 2 (gender) ANOVA on the difference scores for the discrepancy between child and parent age estimates showed that the discrepancy did not differ depending upon the culture of the informants, $F(1, 309) = 0.08$, $p > .05$; the age of the child, $F(2, 309) = 0.97$, $p > .05$; or gender, $F(1, 309) = 0.14$, $p > .05$. There were no significant interactions.

Table 4
Parental Verification of Memories: Did Remembered Events Happen?

Age (in years)	Yes *N* (%)	Reasonable *N* (%)	No *N* (%)	Unknown *N* (%)
Canadian				
8	340 (78.9)	50 (14.7)	25 (6.3)	2 (0)
11	420 (83.1)	85 (14.3)	17 (2.4)	6 (0)
14	533 (83.3)	96 (15.2)	8 (1.0)	1 (0)
Total	1,293 (81.2)	231 (14.5)	59 (3.7)	9 (0)
Chinese				
8	160 (76.7)	30 (19.1)	11 (4.0)	0 (0)
11	168 (66.1)	40 (29.3)	13 (4.5)	0 (0)
14	112 (72.6)	38 (22.1)	6 (5.2)	0 (0)
Total	440 (74.8)	118 (20.1)	30 (5.1)	0 (0)

Discussion

This is the first cross-cultural study to investigate childhood amnesia in children. It extends current research of childhood amnesia by examining both the earliest age of recall and the general accessibility of early memories. Including children of different age groups and from two different cultures further helps to delineate the influences of cognitive and sociocultural factors in early autobiographical memory development. Overall the results are consistent with our predictions.

Our first hypothesis that children would retrieve a greater number of memories from a later age across all age and culture groups was confirmed; that is, memory accessibility increased as a function of the time of event occurrence. This is consistent with the phenomenon of childhood amnesia observed in adults, whereby very few, if any, memories can be retrieved from before age 2 or 3, and memories occurring after that show increasing accessibility. Furthermore, as we predicted, in both culture groups younger children recalled earlier first memories than did older children, a difference appearing to emerge between 8- and 14-year-olds, parallel to the findings of Peterson et al. (2005) and Tustin and Hayne (2008). In addition, we found that in the Canadian sample, 11- and 14-year-olds recalled a greater number of memories overall as well as a greater number of specific memories than did 8-year-olds. This might reflect the nature of the memory fluency task that requires a child to stay on task for several minutes and therefore can be more cognitively demanding for younger children and further impair their performance. On the other hand, in the Chinese sample, the two younger groups recalled more memories than the older group. The findings that Chinese 14-year-olds

recalled significantly fewer early childhood memories as well as significantly later first memories than did the two younger groups might indicate the appearance of adultlike childhood amnesia by age 14 among the Chinese.

Consistent with our prediction that having an earlier first memory would be related to the retrieval of more memories in the memory fluency task, we found that overall, children who recalled earlier first memories were also able to retrieve a greater number of memories, regardless of age and culture. These findings suggest that the age of first memory and the total number of memories recalled both indicate the ability to access early childhood memories, and the two measures together provide a more reliable index of memory accessibility than either one alone (Wang et al., 2004). They further suggest that the ability to recall a memory from the earliest age possible and the ability to access readily multiple early memories may share similar underlying cognitive and social mechanisms at the individual level. Notably, there was an exception of Canadian 11-year-olds who did not show a significant correlation between the age of first memory and memory fluency. It is not clear why this was the case, although we speculate it might be specific to this particular sample (e.g., the influence of outliers). Future research should help to clarify this result.

Findings of cultural differences also confirmed our predictions that Canadian children would access earlier first memories as well as more childhood memories than Chinese children. Notably, we asked children to recall as many memory events as they could that took place before they went to school. As we noted earlier, in Canada formal schooling is considered to start at around age 5 when most children go to kindergarten, whereas in China formal schooling is considered to start at about age 6 when most children attend Grade 1. Consequently, in the memory fluency task, Canadian children might be recalling events from the first 5 years, whereas Chinese children might have the advantage of recalling events from the first 6 years, which would work against our hypothesis that Canadian children would recall more memories than Chinese children. Nevertheless, we found that across all age groups, Canadian children recalled a greater number of childhood memories overall, as well as a greater number of specific, one-time episodes than did their Chinese peers. Canadian children also showed a greater increase in memory recall with the age at time of memory and recalled earlier first memories than did Chinese. The cultural differences in the two indexes of memory accessibility became further enlarged as children grew older. These robust cultural differences in children's accessibility of early memories are consistent with previous cross-cultural research of adults' childhood recollections (Mullen, 1994; Wang, 2001a; Wang et al., 2004). Interestingly, the ages of earliest memory provided by Canadian 8-, 11-, and 14-year-old children was dated at 26.3, 27.1, and 30.5 months, respectively, which were substantially earlier than the average age of earliest memory in North American adults, that is, 42 months (3.5 years; Mullen, 1994; Wang, 2001a). The ages of earliest memory provided by Chinese 8- and 11-year-olds, 36.9 and 37.4 months, respectively, were also earlier than the first memory Chinese adults can retrieve, at 48 months (Wang, 2001a). However, the earliest memory of 14-year-old Chinese children was dated at 50.0 months, comparable to the adult data. These findings suggest that whereas European Canadian children can still access earlier memories than can adults, Chinese children seem to be comparable to adults in terms of childhood amnesia by the age of 14. It would be informative in future research to examine childhood recollections among Chinese children between ages 11 and 14 and among North American children between age 14 and late adolescence to pinpoint further the exact age at which adultlike childhood amnesia emerges in respective cultures.

Furthermore, memory content analysis indicated that Canadian children were twice as likely as Chinese children to focus on themselves in the memory events, whereas Chinese children were more likely to focus on group activities and significant others. Indeed, the top two of the three categories of memories that Chinese children most frequently recalled involved social interactions, whereas only one (the second most frequent) of the three most frequent categories for Canadian children did. These findings corroborate previous research of memory content differences in children and adults across cultures (Han et al., 1998; Mullen, 1994; Wang, 2001a, 2004; Wang & Conway, 2004).

Different family socialization practices, particularly sharing memory narratives, may serve as an important medium for children to develop culture-specific ways of personal remembering (Nelson & Fivush, 2004; Wang, 2001b, 2006b, 2007). The high-elaborative, child-centered memory conversations in North American families model to children how to organize and reinstate

past event information in linguistic and narrative codes that assist long-term memory retention and further help children construct elaborate life stories that highlight their own roles and perspectives. Such conversations are well suited to the goal of facilitating early autobiographical memory development and are consistent with the cultural belief system that prizes individuality and autonomy. In contrast, the low-elaborative, socially oriented memory conversations in Chinese families, in line with the Confucian values of interconnectedness, help to situate the child in a nexus of social relations while downplaying the importance of remembering one's unique experiences (Fivush & Wang, 2005; Wang, 2001b). Over the long term, children come to internalize their parents' values and styles in remembering their personal past (Wang, 2007). In the present study we did not directly assess parental socialization practices but rather assumed culturally divergent normative patterns based on prior research. Although this is a limitation of this study, our findings are nevertheless consistent with the premise that cultural differences in socialization practices underlie differing developmental outcomes in the accessibility and content of children's early memories.

Across age and culture groups, girls recalled earlier first memories than did boys, consistent with prior research with adults. Women often recall earlier memories than do men, including more memories from ages 2, 3, and 4 (Davis, 1999; Mullen, 1994; Rubin, 2000). Social interactive factors have been proposed to account for these differences. Fivush (1998) has suggested that parent–child memory talk is gendered, with both mothers and fathers in North America reminiscing more about shared events with daughters than with sons. Both Mullen (1994) and Davis (1999) account for the gender differences they found by suggesting that earlier memory in North American women reflects this interactive history.

Memory verification showed that children's recollections were surprisingly accurate, whereby a great majority of memories were confirmed by parents as having happened or being reasonable. For the age estimates of memories, as in prior studies that showed slight discrepancies between age estimates provided by rememberers and external sources such as adults present at the time of the event (Bruce, Dolan, & Phillips-Grant, 2000; Eacott & Crawley, 1998; Howes, Siegel, & Brown, 1993), children gave estimates of their first memories that were 4 months earlier on average than did their parents. Important from the current perspective, this difference between age estimates provided by children versus parents was observed regardless of culture, gender, and age. In general, these results are consistent with prior research showing that early childhood memories, provided by children (Peterson et al., 2005) or adults (Bruce et al., 2000; Eacott & Crawley, 1998; Howes et al., 1993), tend to be accurate in content and age estimates.

Taken together, the phenomenon of childhood amnesia has almost exclusively been investigated in adults, but it is critical to examine its emergence during ontogenetic development in order to understand fully the social-cognitive factors underlying this phenomenon. Furthermore, this phenomenon can be better explored empirically by means of both testing the general accessibility of early memories and recalling the single earliest memory from an individual's life. The present study did not directly examine the emergence of childhood amnesia because this issue needs to be addressed longitudinally. Nevertheless, our results indicate that both culture and age mediate children's ability to recall events from their early lives. The differing patterns for the Canadian and Chinese children in their general accessibility to childhood memories, age of earliest memory, and memory content are consistent with prior cross-cultural research with adults. Furthermore, although Canadian 14-year-olds still have earlier and greater access to preschool memories than do Canadian adults, the degree of childhood amnesia already resembles the adult Chinese pattern by the time Chinese children are 14 years of age. Remembering one's personal experiences is thus not merely an individual matter but a sociocultural product.

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