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Abstract

In the present study, the authors set out to investigate whether number of siblings as a contextual ontogenetic factor can explain cultural variance in autobiographical memory (AM). After replicating the commonly found cultural differences in AM in samples from Asia (PR China, $N = 77$), Africa (Cameroon, $N = 68$), and Europe (Germany, $N = 100$), the authors demonstrate that the number of siblings has a substantial effect on AM variables. The cultural variance explained by the number of siblings ranges from 30% in the age of first memory to 99% in specificity and integration. These findings (a) point towards the necessity to include contextual variables in the investigation of cultural differences in AM and (b) highlight the importance of sensitive periods in early childhood for the development of AM.

Keywords:

autobiographical memory, childhood context, cognitive complexity, evolutionary developmental psychology

Many features of childhood can be considered preparations for adulthood in a particular cultural environment. Because cultural change is slow compared to an individual's lifespan, such preparations are optimally achieved through sensitive learning situations early in life (Draper & Harpending, 1988). This is in accordance with empirical evidence in the literature in developmental psychology, in which the first decade of life is considered the psychologically most important ("functional") phase for individual development (Lamb & Sutton-Smith, 1982). Accordingly, child development can be seen as a socially mediated activity in which children gradually acquire culturally relevant and appropriate skills through cooperative interactions with

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more competent members of a society (Vygotsky, 1978). For most children, their developmental context, the so-called microsystem (Bronfenbrenner, 1979), is constituted by the family (i.e., mother, father, and siblings).

In this article, we investigate the potential effects of this childhood context on autobiographical memory (AM) with three samples from Europe (Germany), Asia (People's Republic [PR] of China), and Africa (Cameroon). An increasing number of studies have repeatedly found differences in the content and structure of AM across cultural contexts (e.g., Wang, 2001a). These cultural differences have been mainly traced back to different parental socialization practices, and there are some first indications that siblings (or their absence) may play a crucial role in the formation of AM as well (for an overview, see Nelson & Fivush, 2004; see also Chasiotis, Bender, Kiessling, & Hofer, 2010). Therefore, the aim of this study is (a) to replicate commonly found differences in AM and (b) to investigate whether siblings as culturally competent interaction partners during childhood have an effect on AM and if their presence or absence can partially explain the expected cultural variance in AM in our samples.

Cultural Differences in AM and Parenting

Autobiographical narratives can be considered as one "natural kind" of human cognition (Bruner, 1990). At age 3 to 4, children start to participate actively in the so-called "memory talk" with their parents (Nelson, 1993, Pillemer & White, 1989), a process by which children learn to refer to themselves in the past. This emergence of AM in the preschool years is an important event in human development. Phylogenetically, it is considered a unique feature of the psychological endowment of the human primate (Bischof, 2008; see also Neisser, 1988; Nelson, 1993, 2003), and its ontogenetic, psychological importance is apparent in its numerous functional roles for other skills (Bluck, 2003; Pohl, Bender, & Lachmann, 2005; for a cross-cultural account of its ontogenetic functionality, see Chasiotis et al., in press).

To develop accounts of their past, and thus a sense of selfhood, children heavily depend on social interaction (e.g., Fivush, 1998; Fivush, Brotman, Buckner, & Goodman, 2000; Reese & Fivush, 1993). Parents transmit which life events can be considered appropriate biographical cornerstones for their particular cultural context (Bluck & Habermas, 2000; Conway & Bekerian, 1987). A growing body of research has indicated that these parental reminiscence styles differ across cultures (Reese & Fivush, 1993; Reese, Haden, & Fivush, 1996). Typically, Asian (e.g., Korean, Chinese) mother-child dyads employ a normative style of reminiscence, for example, repeating the same questions until the child produces the expected responses, resulting in rather skeletal and brief memories. In contrast, Western (especially U.S. American) mother-child dyads make use of an elaborative style of talking about the past characterized by extensively confirming and encouraging a child's responses, which in turn results in a highly detailed memory account of the children (see Han, Leichtman, & Wang, 1998; Mullen & Yi, 1995; Wang, 2001b, 2004; Wang, Leichtman, & Davies, 2000). These findings were recently extended by Chasiotis et al. (in press) with a sample from Africa. They found that Cameroonian preschoolers (similar in that regard to Asian children) indicate a significantly later age of earliest memories than German preschoolers and exhibit a more socially oriented, integrated (i.e., structural elements focusing on connection, like describing similarities between social objects; see Chasiotis et al., in press; Woike, 1997) autobiographic information processing than German preschoolers. Such cultural differences are expected to "become larger and more stable among older children" (Wang, 2004, p. 5). Consequently, similar differences have been found among adults (Pillemer, 1998): Westerners (e.g., Caucasian Americans) have more detailed memories with themselves as the central character and indicate a very early first memory, whereas Asians (e.g., Chinese, Koreans) have rather general memories with a strong group orientation and report a later age of earliest

recollection (Mullen, 1994; Wang, 2001a). To conclude, the above literature suggests that participants from prototypically interdependent cultural contexts (e.g., PR China, Korea, Cameroon) make more use of elements that are more appropriate for social interaction (e.g., integration, late recollection, and routine memories), while participants from prototypically independent contexts focus on individuating elements (e.g., early recollection and highly specific memories).

The Ontogenetic Importance of Siblings

It has repeatedly been demonstrated that the existence (or absence) of siblings has an impact on individual development (see Bjorklund & Pellegrini, 2002; Harris, 1998; Sulloway, 1996). Already in preschool children, a substantial number of studies show that the presence of younger children elicits behavioral aspects of the culture-independent intuitive parenting program (Papoušek & Papoušek, 1987; see also Keller, Chasiotis, & Runde, 1992; Keller, Lohaus, Völker, Cappenberg, & Chasiotis, 1999) like motherese (a form of speech used when talking to toddlers and infants, see Papoušek & Papoušek, 1987; Shatz & Gelman, 1973) or cultural teaching behaviors (e.g., older siblings teaching younger siblings how to accomplish everyday tasks; see Maynard, 2002). Recent studies extend this line of thought by indicating that the presence of younger siblings during childhood also affects somatic and reproductive development. The presence of younger siblings can delay the onset of puberty (Chasiotis, Keller, & Scheffer, 2003) and is predictive of parenting motivation and parenthood (Chasiotis, Hofer, & Campos, 2006; for an overview, see Chasiotis, in press). Hence, having or not having siblings substantially influences our development, and it only appears plausible that they may also be involved in “memory talk” (Neisser, 1988) and through that in the process of co-constructing their siblings’ AM as a form of “collective remembering” (Barclay & Smith, 1992).

Research on narrative co-construction has mainly focused so far on the exclusive parent-child dyad—although this is a constellation predominant only in Western cultural settings. Social settings in other cultural contexts are characterized by less dyadic and more coactive interactions with multiple interaction partners within the family (Keller, 2007; Rogoff, 1990). A special scenario arises in PR China, due to the one-child policy that was instituted in 1979, which limits the number of children of urban parents to one (see Lee, 1992). While having many children can be considered typical of rural China, the one-child policy has significantly affected developmental conditions in urban China. Only-children have been described as more egocentric, willful, and selfish in comparison with traditional Chinese standards and Chinese children growing up with siblings (Lee, 1992; Wang, Leichtman, & White, 1998). In other words, a change of the ontogenetic context towards a nuclear (typically Western) family resulted in a more pronounced independent sociocultural orientation of the children. So far, only one study reported on the effects of having or not having siblings on AM in a Chinese sample (Wang et al., 1998): Chinese adults with no siblings reported a significantly earlier age of first memory (thereby highlighting their uniqueness) than any other individuals and were found to be more self-oriented. Yet researchers were reluctant to and did “not intend to equate Chinese only-children in an overarching way with independently oriented Western individuals” (Wang et al., 1998, p. 92). Against the background of the ontogenetic importance of having siblings across cultures (Keller et al., 2004; see also Chasiotis et al., 2003; Chasiotis, Hofer et al., 2006), we seek to determine whether their presence or absence in early childhood can help in the explanation of cultural differences in AM.

Finally, it is worth mentioning that even differences in self-construals, which are interpreted as being due to culture-specific socialization (Markus & Kitayama, 1991), may at least be partially dependent on having (or not having) siblings. As we could show in a related study measuring prosocial value orientation with the conservation scale of the Schwartz Value Survey (SVS; see Chasiotis, Bender, & Hofer, 2010), sibling effects on social value orientation occur

specifically in those scales in which intimate relationships with close relatives are mentioned (see, e.g., the definition of the Benevolence scale by Schwartz [in press]: “the welfare of people with whom one is in frequent personal contact” or the Portrait Values Questionnaire [PVQ] examples in this article). In contrast, sibling effects do not occur in scales dealing with more individualistic, autonomous social values like self-direction and achievement, which provides support for the discriminant validity of this rather crude childhood context measure.

Selection of Samples

The present study was based on the conception of sociocultural orientations that are assumed to draw on different construals of the self (Kağitçibaşı, 1996, 2005; see also Markus & Kitayama, 1991). While our considerations so far represent an individual approach to the importance of siblings, the existence of siblings may also be taken as an indicator of a specific socialization context. For example, in rural agrarian societies with low levels of affluence, children often contribute to the family’s economy and provide a security net for their aging parents (Kağitçibaşı, 2005). Having many children is valued, intergenerational interdependence (i.e., feeling close and connected; see Markus & Kitayama, 1991) is necessary for the family’s livelihood, and a strong sense of tradition and obedience is dominant in parenting (see also Keller, 2007). Independence in this context is not functional (and thus not valued), because an independent child may leave the family and look after her or his own self-interest when he or she is grown. Such a context has been characterized as prototypically interdependent (Kağitçibaşı, 2005). A prototypical independent context can be found in affluent, educated, middle-class, nuclear families (typical for Western countries; Kağitçibaşı, 1996). With alternatives for old-age support, economic dependence on offspring is often not considered necessary or even desirable. Children—often just one—are therefore raised to be independent and self-sufficient, fostering a sense of separateness and uniqueness (Kağitçibaşı, 2005).

Samples were selected for the present study that can be regarded as prototypical for these cultural contexts: a German middle-class sample from Osnabrück as a prototypical independent context and a sample of Cameroonian Nso (the largest ethnic groups in the North-West province of Cameroon) as a rather interdependent context. Typically, researchers claimed that Chinese participants in general represent a prototypically interdependent context. However, a Chinese sample from a suburban context is likely to represent a special case, since the institution of the one-child policy affected traditional family constellations and thus socialization practices. For this reason, the Chinese sample may best be described as coming from an autonomous-related context, as taking up a middle position between the prototypically independent and interdependent context.

Cross-cultural studies, especially those on AM, often focus only on the similarities and differences of individuals from Asian and Western countries (e.g., Conway, Wang, Hanyu, & Haque, 2005; Han et al., 1998; Wang et al., 1998). Including a Cameroonian sample as a prototypical interdependent context (other than well-researched China) greatly increases the opportunity to generalize similarities across cultures, especially when investigating three cultures as in the present study (Van de Vijver & Leung, 1997).

Hypotheses

Hypothesis 1: Cultural differences in AM. Cultural differences in AM concerning the age of earliest memory, the level of structural integration, and the specificity of the memory found in previous studies are expected to be replicable. While we expect Cameroonian participants to have a later first memory, a less specific, and a more structurally integrated memory than German participants, we assume the suburban Chinese sample to take up a middle position.

Hypothesis 2a: Having siblings affects AM. We assume that individuals with siblings will exhibit a pronounced social function of autobiographical recall: Their first memories start at a later age, are structurally characterized by integration, and are rather unspecific (routine) events. In contrast, adults with fewer or no siblings are expected to exhibit memories that are of an earlier age, less integrated, and referring to specific events.

Hypothesis 2b: Number of siblings explains cultural variance in AM. Initial findings on AM differences between only-children and children with siblings in PR China (Wang et al., 1998) point towards the potential importance of siblings for the explanation of cultural differences in AM. We expect that cultural differences in AM will be significantly attenuated once the effect of an individual's number of siblings is eliminated from the cultural variance.

Method

Measures

Assessment of Autobiographical Memories. Because the present study focuses on the functional structure of autobiographical memories, traditional performance tests (like the Autobiographical Memory Interview [AMI]; Kopelman, Wilson, & Baddeley, 1989; or the Autobiographical Memory Test [AMT]; Williams & Broadbent, 1986) were not considered appropriate. Instructing participants to provide a particular memory (e.g., earliest childhood memories; Wang et al., 1998; peak experiences, see McAdams, 1982) qualifies as a more culture-sensitive procedure (Wang, 2004; see also Woike, 2001). In addition, earliest childhood memories reflect not only the most salient features of a child's self-construal at the time the memory was formed (Conway, 1996) but are also assumed to reveal current goals and central themes of the adult's self and personality (Ross & Wilson, 2000).

We therefore adapted the procedure by Wang et al. (1998). Participants were asked to provide two earliest childhood memories (see Appendix D; see also Han et al., 1998). One of the memories was instructed to be centered on the writer herself/himself; the other was instructed to revolve around others in order to incorporate a small variety of memories. Participants were instructed to report only memories that they judged to be their own and were asked to be as precise as possible. Immediately after writing down the memories, participants were asked to estimate their age at the time the event took place. The memories were aggregated after coding.

Coding of Autobiographical Memories.

Specificity. Autobiographical narratives were coded as "specific" or "general" by two experienced coders who agreed in 97% of all cases. Ambiguous coding was resolved through discussion. Specific memories refer to an event that took place at a particular point in time (e.g., visiting Sea World for the first time), while general (or routine) events occurred over a longer period of time or on multiple occasions (e.g., every Christmas; see also Pillemer, 1998).

Cognitive complexity. Cognitive complexity (Woike, 1997) encompasses two different ways of information processing: differentiation (perceiving differences) and integration (perceiving connections). Integration and differentiation refer to structural elements, not content-related elements of the narrative. We have chosen this approach as structure indicates function by defining "the parameters of potential functions" (Robinson & Swanson, 1990, p. 330), which therefore allows us to differentiate between a social (integrated) and individual (differentiated) structural orientation. In the present study, coding was restricted to elaborated levels of both (see Woike, Gershkovich, Piorkowski, & Polo, 1999). Elaborated differentiation refers to making contrasts, comparisons, and restricting perspectives, thereby expressing the separateness of attributes. Elaborated integration, on the other hand, comprises the perception of relationships, similarities,

and dynamic causalities between attributes, thus exemplifying a connected way of information processing for social purposes (Woike, 1994). The manual for cognitive complexity by Woike (1997) measures differentiation and integration separately. It therefore allows for a fine-grained exploration of the two dimensions and does not assume that differentiation is hierarchically higher than integration, as is the case with other manuals on cognitive complexity (e.g., Baker-Brown, Ballard, Bluck, deVries, Suedfeld, & Tetlock, 1992). With Western samples presumably scoring higher on differentiation (Woike, 2001), such a conceptualization could have easily resulted in biasing the interpretation of the findings. Therefore, having no such value judgments, the manual is particularly useful for cross-cultural studies (see Chasiotis et al., in press). Categories for elaborated differentiation comprise *Restriction of Meaning* (expressions that limit a perspective; e.g., “in my point of view”), *Relative Comparison* (comparisons of two or more attributes on a single dimension, e.g., “more”/“most”), and *Contrast* (two objects are differentiated as being opposite to each other; e.g., “happy”/“sad”). Instances of these three categories were summed up to form the frequency score for elaborated differentiation. Elaborated integration consists of *Causal Links* (dynamic/causal influences between/within objects/agents; e.g., “They gave each other space”), *Similarity Statements* (shared attributes, experiences, or analogies between objects/agents; e.g., “Both of my friends came to visit me”), and *Resolutions* (expression of the central theme in the narrative; e.g., “The day I came to visit my sister will stick in my mind forever”; see Woike, 1997). Frequencies of these last three categories were summed up to form the total score for elaborated integration.

Sociocultural Orientation (PVQ)

Many studies on AM assume a priori differences between cultures that are then supposed to result in cross-cultural differences between individuals. Westerners are expected to hold an independent view of themselves, while Easterners are supposed to be more interdependent (Markus & Kitayama, 1991). However, oftentimes this assumption is made without supplying corresponding data about the individual level of analysis (Matsumoto, 1999). We therefore selected the PVQ (Schwartz, Melech, Lehmann, Burgess, Harris, & Owens, 2001) as a bias reduced cross-cultural instrument for the assessment of an interdependent sociocultural orientation. The PVQ conservation values encompass valuing conformity (e.g., “It is important to her/him to fit in and do things the way other people do. She/he thinks she/he should do what others expect of her/him.”), security (e.g., “Her/his family’s safety is extremely important to her/him. She/he would do anything to make sure her/his family is always safe.”), and tradition (e.g., “She/he doesn’t like to boast or draw attention to the things she/he does. She/he wants to be modest.”). These values conceptually share common ground with the interdependent pole of interpersonal distance (relatedness; see Kağitçibaşı, 1996). High scores on these values were hence interpreted as indicating an interdependent sociocultural orientation, while low scores on these values were taken as an indicator of a more independent sociocultural orientation.

Contextual and Sociodemographic Questions. Apart from the above self-report scale, participants were asked to report their gender, age, level of formal education, socioeconomic status, as well as number and age of their siblings.

Procedure

Assessment. Participants were informed that participation was completely voluntary and that their responses would be treated completely anonymously, and they received monetary compensation (\$1 in PR China and Cameroon, and \$6 in Germany).

PR China. Data collection in PR China took place in the economically thriving south-eastern province of Guangdong. Since a Chinese urban middle-class context might be too similar to a German urban middle-class context, and since a rural sample was too difficult to obtain, a sub-urban sample from Panyu (a moderately rural/suburban area with a considerable amount of agriculture on the outskirts of Guangzhou) was recruited. After receiving permission, the study was carried out in a small textile factory. Data assessment (with Chinese questionnaires) took place in the quiet rooms of the factory that were used for workspace (e.g., lunch) and was carried out with the assistance of a bilingual native speaker to avoid experimenter effects.

Cameroon. Data assessment in Cameroon took place in the North West Province of Cameroon, in the vicinity of the cities of Bamenda and Kumbo. Participants had a rural (i.e., agricultural) background and were recruited with the help of local assistants. Participants completed an English version of the questionnaire in small groups.

Germany. Data assessment in Germany took place in Osnabrück, a city in the Northwestern state of Lower Saxony. As a student sample was to be avoided, most participants were recruited by word-of-mouth recommendation among students' relatives and acquaintances. Participants from Osnabrück completed the (German) questionnaires in small groups at the University of Osnabrück. *Translation.* While German participants filled out the questionnaires in German, questionnaires for Chinese participants were translated into Chinese (simple characters), and questionnaires for the Cameroonian sample were translated into English, which is the official language in the region of data assessment. Questionnaires were translated adhering to the suggested translation/back-translation procedure with bilingual native speakers of the required language (i.e., for the English and Chinese version; Van de Vijver & Leung, 1997). Deviations were generally minimal for both versions and were solved in close collaboration with local experts. Chinese participants' open-ended responses (i.e., the memories) were afterwards translated into English; German and Cameroonian responses were processed in the language in which the participant gave them (for a similar procedure, see Han et al., 1998; Wang, 2001a).

Preparation of Data Analysis

In cross-cultural research, equivalence of measures is crucial, in particular as many constructs are derived from Western psychological theories and their application can result in biased interpretations (Poortinga, 1989). Special attention was therefore paid to procedures and methods devised to test and ensure the comparability of the concepts and measures used in this study in order to avoid construct, method, and item bias (Van de Vijver & Leung, 1997). To ensure construct equivalence, instructions of the memory tasks were discussed with local experts and collaborators. Method bias can only partly be tested with statistical procedures (see Van de Vijver & Leung, 1997), so we employed standardized administration, detailed instructions, and the use of fixed scoring rules (e.g., Veroff, 1992). Furthermore, the assessment of test-relevant background characteristics (individual and context variables; e.g., gender and age) was assessed as an important factor in ruling out alternative interpretations for cross-cultural and intracultural differences in test scores (van de Vijver, 2000). Finally, to detect biased items in the self-report questionnaire (PVQ), the statistical and the judgmental approach have been used: To evaluate the comparability of measurements across cultural samples, confirmatory factor analyses (CFAs) using AMOS (Arbuckle, 2005) were carried out. Analyses were limited to the higher order factor of the PVQ. Because results from judgmental and statistical approaches do not necessarily overlap (Engelhard, Hansche, & Rutledge, 1990), items were furthermore discussed with local experts (thus including aspects of the judgmental approach). Statistical bias analyses resulted in an exclusion of three of the PVQ items (for applications of this approach, also see Hofer, Busch, Chasiotis, Kärtner, & Campos, 2008; Hofer, Chasiotis, & Campos, 2006).

Computation and aggregation of autobiographical memories. Participants in this study were asked to report two earliest childhood memories: one centered on themselves and one focused on others. Following the procedure by Wang (2004), memories were aggregated to form one score per dependent variable for further analyses. To calculate a composite score of *cognitive complexity*, the mean integration score was divided by the sum of the mean differentiation and integration score, resulting in the percentage of integration within the cognitive complexity (see also Woike et al., 1999). The final score for the specificity of the two memories was computed in a categorical way: If both memories were either specific or routine events, the aggregated score remained “specific” or “routine”; if memories differed in specificity, the category “mixed” was applied. Finally, for the age of first memory, the earliest provided memory was used.

Reliabilities. Two coders were trained in the scoring of autobiographical memories with the *Categories of Complexity Scoring Manual* (Woike, 1997), achieving consistently an intercoder agreement of above 90% with the training material across all subcategories of cognitive complexity. All memories were then coded independently by these two coders, resulting in an average intercoder agreement across subcategories of cognitive complexity of 85.71% for German memories, 88.89% for Chinese memories, and 88.64% for Cameroonian memories. Any disagreements were resolved by discussion. The same two coders rated the specificity (specific vs. general) of each AM, resulting in an intercoder reliability of well above 95% for each culture. Rare cases of disagreement were resolved in discussion.

Sociocultural orientation. Next, the PVQ scale was composed and reliabilities were computed within and across cultures. The scale ranged from a modest internal consistency of $\alpha = .56$ in Cameroon to acceptable Cronbach's alphas of $.70$ in Germany and $.71$ in PR China. The overall internal consistency of $\alpha = .66$ for the interdependent sociocultural orientation scale indicates a moderate reliability (see Nunnally, 1978), presumably due to a reduced number of items after establishing cultural equivalence.

Sample characteristics. The sample totaled 245 participants (for an overview, see Table 1) ranging from 20.03 years to 40.17 years of age. Analysis of variances did not reveal significant differences between the three cultures with respect to the age of the participants, $F(2, 242) = 2.74$. No culture-related differences could be found for the distribution of gender, $\chi^2(2, 245) = 3.85$. Cultures differed with respect to the number of years spent in formal education, $F(2, 245) = 6.64$, $p < 0.01$, and post hoc Bonferroni tests revealed that Cameroonian participants had spent less time in educational institutions than both Chinese and German participants, while the Chinese and German sample did not differ from each other.

The three samples also differed with respect to the number of siblings participants indicated, $F(2, 242) = 130.43$, $p < .001$, with Cameroonian participants reporting more siblings than both German and Chinese individuals, while Chinese participants indicated having more siblings than German participants (post hoc Bonferroni tests).¹

Results

Before differences among the cultural samples are described, the effects of demographic variables (age, gender, and education of participant) on AM were examined in analyses of variances. No effects on AM were observed across and within cultures for age of participants and for educational background. In contrast, gender has to be controlled with respect to age of first memory, as females reported a later first memory ($M = 6.03$ years; $SD = 2.31$) than males ($M = 5.32$ years; $SD = 1.80$), $F(2, 242) = 5.37$, $p = .02$, across cultures. In further analyses, gender of participant was therefore included as covariate or the residual of age of first memory was computed, thereby controlling for the effect of gender on AM.

Table 1. Sample Characteristics

	PR China	Cameroon	Germany	Total
Gender (m = male, f = female)	27m, 50f	34m, 34f	47m, 53f	108m, 137f
Age				
Range	20.50 to 38.87	20.03 to 40.17	20.06 to 40	20.03 to 40.17
Mean (SD)	28.40 (4.77)	26.70 (5.38)	28.43 (5.30)	27.94 (5.20)
School years				
Range	7 to 18	7 to 13	7 to 18	7 to 18
Mean (SD)	12.72 (1.55)	11.84 (2.20)	12.80 (1.60)	12.50 (1.82)
Number of siblings				
Range	0 to 6	0 to 9	0 to 5	0 to 9
Mean (SD)	1.87 (1.14)	4.6 (2.15)	.88 (1.12)	2.22 (2.13)
PVQ Conservation Scale				
Range	2.50 to 6.00	3.40 to 6.00	1.70 to 5.20	1.70 to 6.00
Mean (SD)	4.21 (.66)	4.83 (.58)	3.40 (.74)	4.04 (.89)
Age of first memory				
Range	4.38 to 13.50	3.50 to 10.46	1.42 to 11.50	1.42 to 13.50
Mean (SD)	7.70 (1.92)	6.53 (1.54)	4.31 (1.45)	5.72 (2.12)
Specificity				
Range	0.00 to 2.00	0.00 to 2.00	0.00 to 2.00	0.00 to 2.00
Mean (SD)	1.58 (.57)	.77 (.76)	1.39 (.79)	1.25 (.80)
Elaborated integration (weighted)				
Range	.00 to .75	.06 to .39	.00 to .36	.00 to .75
Mean (SD)	.21 (.16)	.23 (.09)	.13 (.10)	.18 (.12)
Cognitive complexity (weighted)				
Range	0.00 to 7.00	0.33 to 10.00	0.00 to 4.00	0.00 to 10.00
Mean (SD)	2.07 (1.54)	2.69 (2.00)	1.22 (1.12)	1.97 (1.71)

Sociocultural Orientation

An analysis of variance was conducted to investigate cultural differences in sociocultural orientation in PR China, Cameroon, and Germany, followed by post hoc Bonferroni tests. Samples differed significantly with respect to the PVQ conservation scale, $F(2, 241) = 92.55, p < .001$. Post hoc Bonferroni are in line with expectations and reveal that Cameroonian ($M = 4.83, SD = .57$) and Chinese participants ($M = 4.21, SD = .65; ps < .001$) hold a significantly more interdependent sociocultural orientation than German participants ($M = 3.40, SD = .74$), while not differing among each other.

Hypothesis 1: Cultural Differences in AM

An analysis of variance was conducted to investigate cultural differences in AM in PR China, Cameroon, and Germany, followed by post hoc Bonferroni tests in order to replicate findings from previous studies (e.g., Wang et al., 1998) and to extend these findings with a measure for cognitive complexity (Woike, 1997).

Age of first memory. In accordance with previous studies (see Conway et al., 2005; Mullen, 1994), significant cultural differences for the age of participants' earliest memory could be confirmed, $F(2, 242) = 74.15, p < .001$. As expected, German participants have the earliest autobiographical recollection ($M = 3.57$ years, $SD = 1.41$), with both Cameroonian and Chinese participants denoting their first memory at a significantly later age ($M = 5.57$ years, $SD = 1.56$;

Table 2. Correlation Between Childhood Context and Autobiographical Memory

<i>N</i> = 194	PVQ Conservation Scale	Age of First Memory	Specificity	Elaborated Integration	Cognitive Complexity
Number of Siblings	.49***	.27***	-.33***	.31***	.18*

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

$M = 6.71$ years, $SD = 1.97$, respectively). However, Chinese participants also reported a significantly later age of their first memory than Cameroonian participants. As an earlier age of first memory is associated with a higher self-orientation, this finding indicates that German individuals' memories are more suitable for the self-function of autobiographical recall than Cameroonian or Chinese individuals' memories.

Specificity. Participants from PR China, Cameroon, and Germany also differed concerning the specificity of their reported autobiographical memories, $F(2, 242) = 20.87$, $p < .001$. While German participants' memories ($M = 1.40$, $SD = .79$) were more specific than memories of Cameroonian participants, thereby indicating a more self-focused use of autobiographical recall ($M = .77$, $SD = .76$, $p < .001$), memories of Chinese individuals ($M = 1.58$, $SD = .57$) did not differ from German participants and were even more specific than Cameroonian memories, which indicates a self-serving use of autobiographical memories for Chinese participants.

Cognitive complexity. Analyses revealed significant differences across cultural groups in cognitive complexity, $F(2, 242) = 4.23$, $p < .05$. These differences were in the expected direction: German participants were more differentiated ($M = .58$, $SD = .34$) in their autobiographical memories than Cameroonian participants ($M = .71$, $SD = .28$). Although Chinese participants were—as expected—close to the Cameroonian participants ($M = .68$, $SD = .25$), they did not differ significantly from German participants. This result indicates that German individuals' information processing in autobiographical memories is more appropriate for self-focused functions of autobiographical recall. No differences in differentiation could be obtained, but the investigated cultural groups differ in their level of integration, $F(2, 242) = 16.75$, $p < .001$, which seems to drive the overall differences in cognitive complexity: Chinese and Cameroonian participants were not significantly different from each other ($M = .21$, $SD = .16$; $M = .23$, $SD = .08$, respectively), but both used significantly more elaborated integration to structure their autobiographical memories than German participants ($M = .13$, $SD = .11$). In other words, the structure of both Chinese and Cameroonian individuals' autobiographical memories were more apt to serve social functions than that of German participants.² In conclusion, all AM variables, including cognitive complexity, were in accordance with the existing body of cross-cultural research.

Hypothesis 2a: Having siblings affects AM

Membership in a cultural group may not be the only or even the most important variable to explain cultural differences in the dependent variables of the present study. To get a first impression about the relationship of the number of siblings with the dependent variables that vary across cultures, correlations across cultures were computed. The number of siblings correlated highly with the PVQ conservation value scale and with all AM variables (see Table 2)³: The more siblings an individual indicated, the more interdependent her/his values are, the more integrated her/his autobiographical information processing is, the later the age of earliest memory is, and the more general the autobiographical account reported is.

Hypothesis 2b: Number of siblings explains cultural variance in AM

Sobel tests reveal that number of siblings can be regarded as a highly significant mediator of the relationship of culture for all dependent AM variables (see Table 3). Moreover, with number of siblings as well as culture related to the manner of autobiographical recall, it is necessary to ascertain their respective amount of explained variance. First, the effect size of culture on the dependent variable will be computed in a univariate analysis (adjusted R^2). Then, using linear regression analyses, the effect of the childhood context variable on the dependent variable will be extracted, and the residual effect of culture on the particular dependent variable computed. Finally, univariate analyses are carried out with the cultural residual as the predictor of the dependent variable to compute its adjusted effect size (see Poortinga, van de Vijver, Joe, & van de Koppel, 1987; for applications of this approach, see also Chasiotis, Hofer et al., 2006; van Hemert, 2003).

For sociocultural orientation, elaborated integration, and age of earliest memory, extracting the number of siblings from the effect that cultural group membership had on the dependent variable resulted in a pronounced decrease of explained variance by culture alone. For cognitive complexity, and specificity, eliminating the effect of the number of siblings even rendered cultural group membership insignificant. The amount of reduced variance ranges from 30% (age of earliest memory) to 99% (cognitive complexity; see Table 3 for all results).⁴

Discussion

The present study is innovative for the field of cross-cultural research on AM in a number of key aspects. First, after replicating common cultural differences in AM, we could link those differences to an individual's number of siblings as a marker of her/his ontogenetic context. Having more siblings—and thus potentially more interaction partners in early childhood—leads to a pronounced social function of autobiographical recall (i.e., more integrated, earlier, and less specific memories). Second, we could demonstrate that the amount of variance in AM variables that can be explained by cultural group membership is substantially reduced (30% to 99%) when eliminating number of siblings from the equation.

Before discussing the results related to our hypotheses in more detail and elaborating on the implications of our findings, it is worth mentioning that not only cultural differences in variables on AM but also 67% of the cultural variance in sociocultural orientation could be explained by sibling effects. This could indeed mean that differences in self-construals, which are interpreted as being due to culture-specific socialization (Markus & Kitayama, 1991), may at least be partially dependent on relevant ecological characteristics shared by participants from cultural samples such as systematic biases due to having (or not having) siblings.

Hypothesis 1: Cultural differences in AM

In line with previous cross-cultural studies, cultural differences in AM variables could be replicated: Participants from Germany reported an earlier age of first memory than Cameroonian or Chinese participants, and they had more specific memories than Cameroonian participants. In addition, differences obtained in cognitive complexity are in line with traditional measures of autobiographical recall in cross-cultural research (for similar results with preschool children, see Chasiotis et al., in press). Both Chinese and Cameroonian individuals used significantly more elaborated integration to structure their memories, which resulted in an overall higher complexity. An integrated structure can be interpreted as more apt to serve social purposes of recall, because it features structural elements (causal links, similarities, and resolutions) that enable an individual to make use of her/his memories to stay connected with others (see Woike, 1994; Woike et al., 1999).

Table 3. Explained Cultural Variance by Number of Siblings

Regression dv	Regression 1:		Regression 2:		Regression 3:		Mediator Analysis (Sobel Test)	
	Adjusted R ² (FValue)	Culture on dv	Number of Siblings on dv	Residual of Culture (w/o Siblings) on dv	Reduction of Explained Variance by Culture	iv = culture	m = number of siblings	iv - m = .70 (SE = .12)
PVQ Conservation Scale		$\beta = .59^{***};$.35 ^{***} (F _{1,241} = 131.73)	$\beta = .41^{***};$.16 ^{***} (F _{1,241} = 47.38)	$\beta = .34^{***};$.11 ^{***} (F _{1,241} = 32.45)	67.4%			5.32 ^{***}
Age at first memory		$\beta = .65^{***};$.42 ^{***} (F _{1,194} = 146.39)	$\beta = .30^{***};$.09 ^{***} (F _{1,194} = 19.15)	$\beta = .58^{***};$.33 ^{***} (F _{1,194} = 99.13)	30%			3.65 ^{***}
Specificity		$\beta = .38^{***};$.14 ^{***} (F _{1,211} = 36.46)	$\beta = -.33^{***};$.10 ^{***} (F _{1,211} = 28.80)	$\beta = .13^{+};$.01 ⁺ (F _{1,211} = 3.61)	99%			-5.33 ^{***}
Elaborated Integration		$\beta = .35^{***};$.12 ^{***} (F _{1,211} = 29.65)	$\beta = .31^{***};$.09 ^{***} (F _{1,211} = 22.21)	$\beta = .13^{*};$.01 [*] (F _{1,211} = 3.95)	93%			4.61 ^{***}
Cognitive Complexity		$\beta = .37^{***};$.13 ^{***} (F _{1,211} = 24.90)	$\beta = .38^{***};$.14 ^{***} (F _{1,211} = 25.82)	$\beta = .11^{ns};$.00 ^{ns} (F _{1,211} = 1.96)	99%			5.78 ^{***}

Note: iv = independent variable; m = mediator; dv = dependent variable; SE = standard error.

⁺p < .10. ^{*}p < .05. ^{**}p < .01. ^{***}p < .001.

There were some results which would be unexpected based on the cultural group membership alone—but for whom our sample selection provides possible interpretations. In previous studies, Chinese participants have been generally considered to be prototypically interdependent (e.g., Wang et al., 1998). However, in the present study, suburban Chinese participants did not differ from German participants with respect to their level of formal education, and both samples were more educated than the Cameroonian sample. This contextual indicator could suggest that the Chinese sample may have indeed represented not an interdependent but rather an autonomous-related cultural context (see Kağıtçıbaşı, 2005). An increasingly urban, affluent lifestyle with diminishing material dependencies between generations is likely to have psychological implications: with alternatives to old age support, children do not have to look after their aging parents (see Kağıtçıbaşı, 1996, 2005).

Specificity. Based on cultural group membership alone, it would be an unexpected finding that Chinese participants' memories were more specific than those of Cameroonian participants. However, since Chinese participants may be more accurately described as having an autonomous-related background, they may have been less oriented toward others than Cameroonian participants (from a more prototypically interdependent context) and may thus have recalled specific memories to set themselves apart from others.

Cognitive complexity. No cultural differences in elaborated differentiation could be confirmed. This is surprising considering that many researchers have foreshadowed a "less differentiated autobiographical self" (Nelson & Fivush, 2004, p. 576) in interdependent contexts. One interpretation could be that individuals—irrespective of cultural context and sociocultural orientation—make use of elaborated differentiation to a similar extent and that cultural differences arise via differences in elaborated integration. Another interpretation, however, comes to mind when taking a closer look at relative comparisons, a coding unit of elaborated differentiation: On the one hand, relative comparisons, as described by Woike (1997), are useful to set oneself apart from others and therefore constitute an important element of differentiation. On the other hand, individuals who are oriented toward others and—for example—want to fulfill expectations of their social context to better fit into their social role (Markus & Kitayama, 1991) may as well use relative comparisons to evaluate and communicate their success in doing so. Distinguishing between self-serving and other-serving uses of relative comparisons would certainly render an investigation of elaborated differentiation more conclusive in future studies.

Hypothesis 2: Number of siblings explains cultural variance in AM

Traditionally, differences in parent-child interactions have been investigated as a major source for individual differences in reminiscence style and their influence is widely documented (e.g., Fivush et al., 2000; Reese & Fivush, 1993). However, it has been repeatedly noted that siblings play a substantial role for the development of other siblings: they engage in parental behavior directed at younger siblings, they teach other siblings important cultural norms, and they exhibit behavioral aspects of the intuitive parenting program. Accordingly, we propose in the present study that siblings—as well as parents—may engage in activities that shape the reminiscence style of their siblings. And indeed, AM could be related to the number of siblings of an individual (see Table 3). The proportion of explained effect sizes for autobiographical variables ranges from 30% (age of first memory) to an astonishing 99% (specificity and cognitive complexity). Obtaining a reduction in the amount of explained variance of "only" 30% for the age of first memory could indicate that it represents a rather hard-wired mnemonic feature that varies less across cultural contexts. Methodologically, this argument is supported by its smaller variance compared to specificity, elaborated integration, and cognitive complexity (see Table 1; for testing equality of correlated variances, see Geenen & van de Vijver, 1993; Guilford & Fruchter, 1973).

The impact of siblings on autobiographical recall could be manifold. First, numerous siblings are more typical for contexts that are considered interdependent (rural, less affluent; see Kağıtçıbaşı, 1996, 2005), in which feelings of connectedness are encouraged (partly as a means for securing parental old age support). Growing up with many social interaction partners, and with encouragement to stay connected to them, promotes the emergence of an interdependent self-construal. This may be facilitated by caretakers (parents and siblings) engaging in a normative reminiscence style and may ultimately result in a more social-oriented use of autobiographical memories as an adult. Another interpretation, compatible with this first one, is more pragmatic: If multiple children are present, it is highly improbable that parents have sufficient time to engage with each child in a highly elaborative memory talk. In such a scenario, it is more likely that parents will reminisce with their children in a normative style (i.e., focus on repeating questions until the expected response has been provided by the child). Unfortunately, a decision on which of these scenarios (or both) may apply best to explain effects of siblings on autobiographical remembering cannot be reached on the basis of the present study. In other words, future studies will need to take a closer look at how these effects are psychologically mediated in early childhood. Developmental, cross-cultural studies are therefore needed to identify the psychological mechanisms that carry this developmental trajectory (for similar approaches, see Chasiotis, Hofer et al., 2006).

In addition, the number of siblings does not merely represent a psychological variable but also a contextual marker, signifying either a more rural, less affluent developmental setting (more siblings, prototypical interdependence), or an urban, affluent setting (fewer siblings, prototypical independence; see Kağıtçıbaşı, 1996, 2005). In other words, the impact of siblings could be a direct psychological one through the presence of many interaction partners who instantiate a more social style of reminiscence or—more pragmatically—rooted in parental resource limitations when interacting with many children, which results in a more normative reminiscence style.

Previous findings on other psychological variables indicate that the role of siblings may be more complicated. On the one hand, having numerous siblings leads to a lower performance in theory of mind tasks, while a high performance in such tasks has been associated with an independent self-construal and a self-function of AM (see Chasiotis, Kiessling, Hofer, & Campos, 2006; Chasiotis et al., in press). But on the other hand, the presence of older siblings has been found to foster the performance in theory of mind tasks (Perner, Ruffman, & Leekma, 1994; Ruffman, Perner, Naito, Parkin, & Clements, 1998). Accordingly, such differential effects of siblings have to be more closely investigated in future studies, because they represent an important—yet too often neglected—influence on psychological variables (see also Chasiotis, Hofer et al., 2006).

Limitations and Future Perspectives

A major limitation of the current study concerns the investigation of sibling effects beyond the mere number of siblings: The three samples differed significantly from each other in the distribution of birth order, and low cell sizes did not allow for a full, comparative analysis. Therefore, studies are needed with balanced siblings' distribution to more precisely show that both within and across cultures the number of siblings (and birth order) is related to participants' functional orientation in AM. Additionally, as there are only few studies on the functions of AM and only a handful of empirical measures to assess these functions, it is necessary to investigate their overlap in order to make findings comparable. A first step could include an intracultural mono-trait-multimethod approach for cognitive complexity and the self-report questionnaire Thinking About Life Experiences (TALE; Bluck, Alea, Habermas, & Rubin, 2005). It is expected that in such a triangulation (Van de Vijver & Leung, 1997) convergent results can be obtained.

While our approach can generally be related to cross-cultural psychological research demonstrating the power of situational constraints and opportunities in the social ecology to account for the emergence and maintenance of culturally typical behaviors (e.g., Gigerenzer, 2000; Yamagishi, Hashimoto, & Schug, 2008), even more similarities can be found with the concept of the socio-ecological self. According to this specific line of research, childhood and adolescence experiences of (in-)stability in the individuals' social environment shape their self-construal (Oishi, Lun, & Sherman, 2007). It would be interesting to combine this approach with the present findings on the importance of siblings in the explanation of cultural differences. If we assume that families with many siblings are less mobile than smaller families, the link between residential mobility in childhood and a relative centrality of the personal over the collective self would be consistent with our results that having more siblings lead to a more collective self. Future studies could explore how these two confounding aspects of childhood context could be disentangled by controlling for residential mobility.

Conclusion

The examination of childhood contextual variables offers an avenue to explain differences in autobiographical recall between cultural samples and to identify what exactly constitutes them. In other words, what appeared to be "cultural" differences may in fact be to some extent more appropriately described as differences in ontogenetic environment. Such childhood contextual conditions vary across cultures, and specific family constellations (e.g., an only child with parents) are not limited to one specific cultural setting (see Chasiotis et al., 2003; Chasiotis, Hofer et al., 2006; Keller et al., 2004). For example, the introduction of the one-child policy in China has created a family setting that deviates from traditional Chinese standards (Lee, 1992). An investigation of such contextual variables may also shed light on the phenomenon of "Westernization" in rapidly developing countries. Developmental factors like number of siblings and family size may play a crucial role for the accompanying changes and transitions in self-construal and related psychological concepts like the functions of AM (see Kağıtçıbaşı, 1996, 2005; Keller et al., 2004).

One could argue that culture determines family composition and structure. However, there is a long tradition in anthropology and psychology to regard maintenance systems, like family structure, as dependent on environmental conditions and resources (Berry, 1976; Keller, 2007; Super & Harkness, 1986; Whiting, 1963). Therefore, context variables like socioeconomic status during childhood, birth order, or number of siblings can be expected to exert highly similar influences on developmental trajectories across different cultural contexts (Chasiotis, in press). On this basis we suggest that many psychological characteristics, like AM, that are typically attributed to cultural differences may reflect instead systematic variations in family constellations across cultural contexts.

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Notes

1. Because of sample size restrictions, birth order is not considered as a predictor in the statistical analyses. Dichotomous comparisons of participants with siblings (first-, middle-, and lastborns) and without

- siblings (only children) or with(out) older (only children and firstborns vs. middleborns and lastborns) or with(out) younger siblings (first- and middleborns vs. lastborns and only children) revealed that the number of siblings accounted for all birth order effects in univariate analyses.
2. In line with this interpretation, we found that when asking participants for social, other-centered memories, they reported a later age for their memory ($M = 6.21$, $SD = 2.97$) than in self-centered memories ($M = 5.23$, $SD = 2.13$), $t(194) = -4.69$, $p < .001$, they were also less specific in other-centered memories ($M = .58$, $SD = .49$) than in self-centered memories ($M = .67$, $SD = .47$), $t(211) = 2.53$, $p < .05$, and finally they reported more elaborated integration in other-centered memories ($M = .22$, $SD = .20$) than in self-centered memories ($M = .14$; $SD = .14$), $t(210) = -5.13$, $p < .001$.
 3. Due to low sample sizes, analyses within cultures did not yield significant correlations of PVQ and the AM variables with number of siblings. Nevertheless, Fisher's r-to-z transformation revealed no significant differences between the correlation coefficients in the respective samples.
 4. Hierarchical analyses controlling for moderating effects of culture to test the relative contribution of number of siblings and conservative value orientation (PVQ) on the AM variables (see van de Vijver & Leung, 1997; for other applications of this approach, see Chasiotis, Hofer et al., 2006, Chasiotis et al., in press) showed that after entering number of siblings, PVQ still had a significant effect on age of first memory only, while becoming insignificant for specificity, elaborated integration, and cognitive complexity. Further statistical information can be requested from the authors.

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